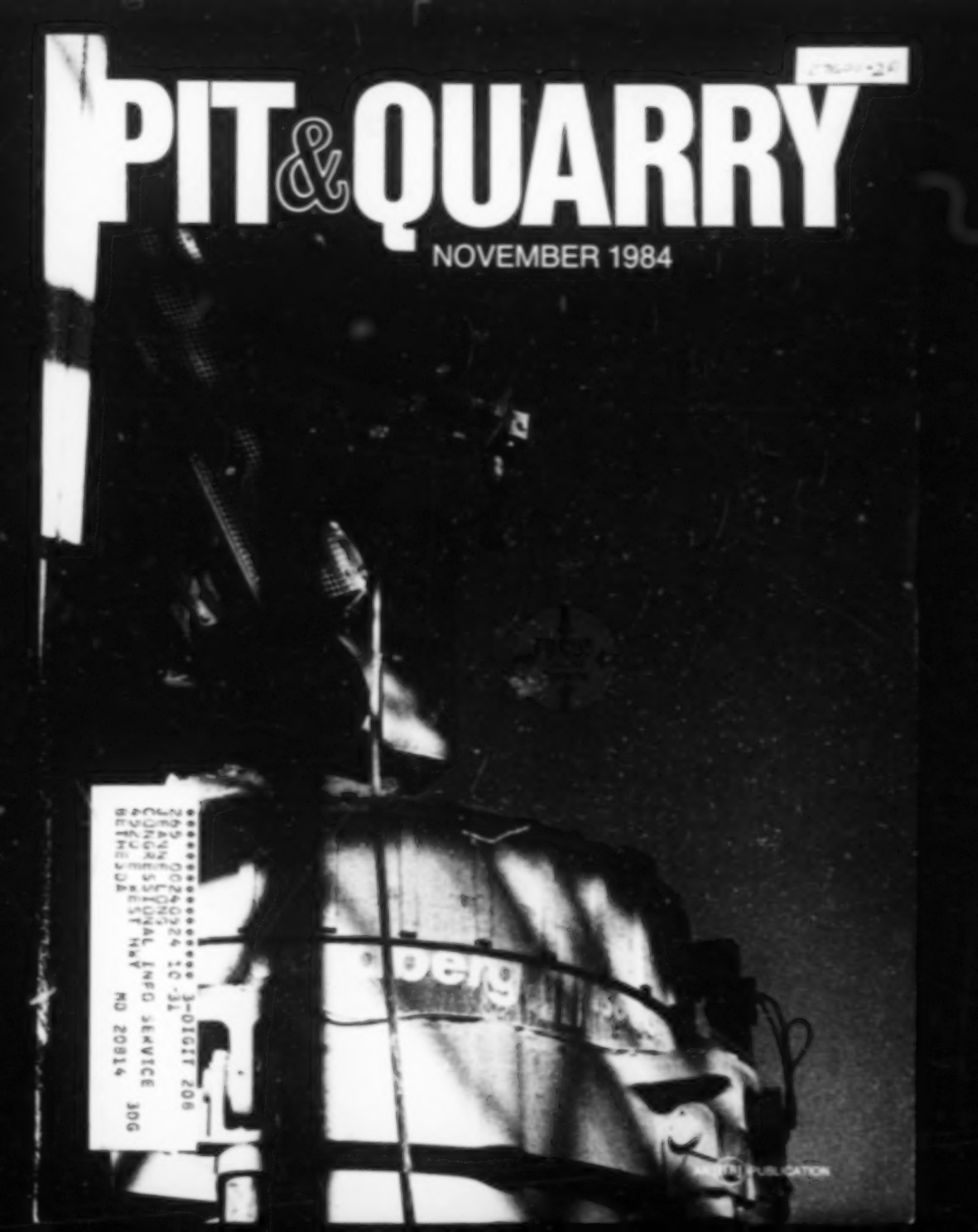
PIT & QUARRY

NOVEMBER 1984



PIT & QUARRY

page 30

page 72

page 36

EDITORIAL

28 **An historic step forward** . . . . . **Sandy Herod**

PLANTS

30 **Quapaw's versatile new plant meets changing market needs** . . . . . **Don Michard**
Stationary limestone crushing facility, rated at 600 tph, serves growing Oklahoma concrete/asphalt producer

OPERATING & TECHNICAL

◉ 36 **Low cost technology automates wet process cement kilns** . . . . . **Ron Rajki**

54 **Harnessing a personal computer to the crusher** . . . . . **Mark White**
Software program is workhorse while operator holds the reins

◉ 66 **Computerized plant system boosts output, efficiency at Genstar facility**
Complementary benefits in equipment, product throughput data

◉ 72 **Computer helps Melvin Stone cut costs** . . . . . **Eric Schroder**
Company develops own software; day-to-day operations simplified

MANAGEMENT

◉ 49 **There's a human side to high tech** . . . . . **Joseph J. Pfohl, Jr.**
Companies must develop plan to involve employees

60 **NCSA conference explores trends in pavement design, material specs** . . . . . **Don Michard**
Urge more use of manufactured sand in highway, general construction

CONTENTS/NOVEMBER 1984, VOL. 77 NO. 5

AN (IRJ) PUBLICATION

ASSOCIATIONS

45 **National Stone Association born of NSCA/NLI consolidation** . . . . . **Sandy Herod**
Combined resources, talents provide high potential for industry service

SAFETY

✦71 **Entrapment in unconsolidated materials** . . . . . **David C. Meyers**

DEPARTMENTS

7 **The National Scene**
10 **Industry News**
18 **Coming Events**
20 **Truck Topics**
24 **Through the Side Mirror**
77 **New Products, Services**
82 **Useful Literature**
88 **Manufacturers' News**
93 **Classified Ads**
104 **Advertisers' Index**
105 **Readers' Service Card**

AND NEXT MONTH

Heavy duty on- and off-highway equipment is highlighted

ON THIS MONTH'S COVER

An ultrasonic level detection sensor, mounted above the crusher cavity, works with other sensors to provide automatic crusher control at Genstar Stone Products Co. facility in Maryland. Photo courtesy of Rexnord, Inc.

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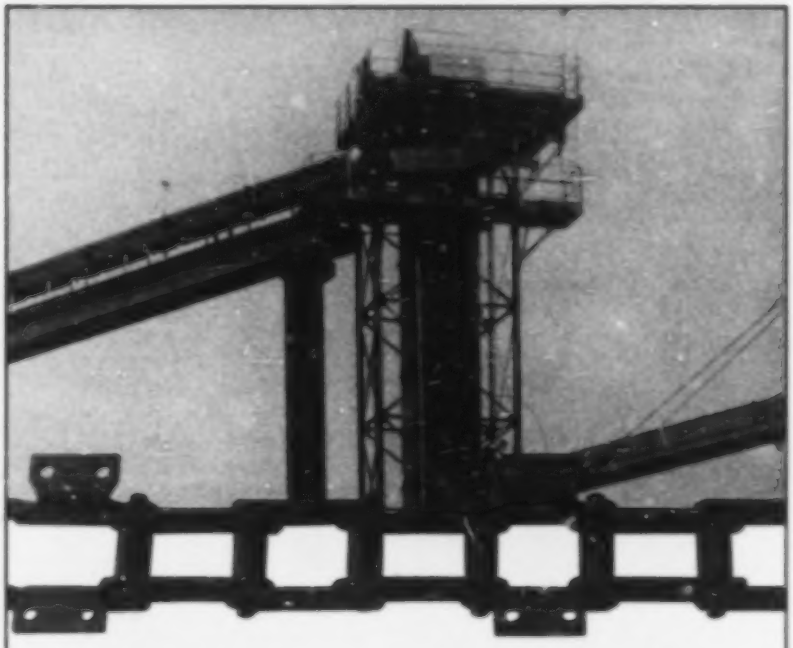
Comparison for 1984/1983 Construction Contract Values*

	8 Mos. 1984 ($000,000)	8 Mos. 1983 ($000,000)	Cumulative Percent Change
Nonresidential building	$ 48,389.1	$ 40,895.2	+18
Residential building	71,517.0	62,340.0	+15
Nonbuilding construction	24,812.9	27,787.0	−11
Total construction	$144,719.0	$131,022.2	+10

Dodge Index
(1977 = 100, Seasonally Adjusted)

June 1984 ..... 148 July 1984 ..... 152 August 1984 151

*Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems



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- burning line modified through the addition of a precalciner for the use of various solid fuels, and a grate cooler replacing the planetary cooler.

This equipment is to be in place by mid-1985.

ARTBA names Gerald Cichy to newly created post

Gerald R. Cichy, director of the Montgomery County (Md.) Department of Transportation for the past 5 years, has been appointed executive vice president of the American Road & Transportation Builders Association, according to chairman R.E. Hirschman. In the newly created position, Cichy will be in charge of operations and membership services for the national organization. He will report to president Daniel J. Hanson. As head of the Montgomery County DOT, Cichy led an organization of more than 1,100 employees responsible for the maintenance of more than 1,700 miles of road and the operation of a 200-bus transit fleet.

Air compressor guide features technical data

An air compressor selection and application guide, providing 28 pages of practical information on 1/4- through 25-hp compressors is available from the Compressed Air and Gas Institute. Developed by members of the Institute's Stationary Single Acting and Unit Type Section, the guide features a range of educational and technical data, including definition of compressed air, advantages of air power, types of air compressors, controls, and accessories, and installation guidelines.

In addition, the publication provides useful information on the protection, maintenance, and troubleshooting of air compressors, as well as a glossary of terminology, definitions, formulas, and preferred metric units.

The guide costs $2 and is available through the Institute, 1230 Keith Building, Cleveland, Ohio 44115.

NCSA conference explores trends in pavement design, material specs

Urge more use of manufactured sand in highway, general construction

By Don Michard

Studies aimed at increasing the use of manufactured sand in highway construction should be incorporated in pavement research programs, according to Robert M. McKeagney, Vulcan Materials Co., a speaker at the recent Conference on Crushed Stone for Road and Street Construction and Re-construction sponsored by the National Crushed Stone Association.

Attended by some 150 crushed stone producers and national, state, or local level highway transportation officials, the conference presented the views of national authorities on appropriate uses of stone products as well as design trends in highway construction.

Subjects covered included the updating of the AASHTO Interim Pavement Design Guide and the Strategic Transportation Research Study (also known as "STRS" or "STARS") Program; the latter proposes 5 years of concentrated research at a cost of $150 million.

The potential economic benefits of increasing the use of manufactured sand were noted by several speakers and discussed in detail by McKeagney; he focused on the impact of NCSA research, used by member companies to achieve more practical and realistic specifications for stone sand as the fine aggregate in concrete for pavements and structures.

McKeagney noted that, in the roughly 50-year period during which stone sand has been used, its special characteristics have received very little recognition. "Instead, use of manufactured sand has been allowed provided it could be made to look and act just like natural sand. In most cases, this required the washing out of valuable fine mineral particles, which we refer to as 'microsand,' that would

Some of the panel members at NCSA's conference on crushed stone for road construction and reconstruction, from left: Dick Barksdale, Georgia Tech; Adrian Pelzner, U.S. Forest Service; George W. Ring, FHWA; Gary Byrd, Transportation Research Board; and Harry Smith (at podium) also of TRB.

need to be replaced with portland cement, fly ash, or other fine particles to improve its workability," he said.

Manufactured sand, McKeagney noted, is different from natural sand in gradation, particle shape, and texture; each of these characteristics should be taken into account in specifications so that the most effective use of the material is made. "It is possible to produce a manufactured sand meeting essentially the same gradation characteristics as natural sand. However, when stone is crushed to produce fine sand particles, there always are minus 200 mesh particles in them--usually to the extent of 5-10%. Washing all those out changes the gradation and workability characteristics of the product."

McKeagney showed magnified slides of natural and manufactured sand in the size of minus 4 to plus 8. Natural sand, with rounded particles, exhibited relatively low voids. Manufactured sand, more rough and angular in shape, had more voids. "One way to handle this problem is to leave in those fines that we work so hard to wash out," he said.

The speaker cited NCSA Bulletin 13, published in 1936 and updated in 1964, in which conclusions were drawn indicating that increased fines could be tolerated in some concrete mixtures without ill effect. Another major point stressed by McKeagney: "Fines in manufactured sand, as small as minus 200 mesh material, are solid stone particles, not clay or silt that is considered deleterious material."

Studies by NCSA of manufactured sand used in more than 170 different concrete mix combinations, conducted during the 1970s, demonstrated a number of conclusions regarding the effects of particle shape and gradation on properties of both plastic and hardened concrete. McKeagney summarized the findings:

"Particle shape was not particularly critical to the slump characteristics unless extremes of flatness and elongation were reached that resulted in fine aggregate voids in excess of 53%.

Angularity itself did not require a significant increase in the water/cement ratio that is now associated with natural sand mixtures.

"The fines content can be increased in manufactured sand and the aggregate/sand ratio can be adjusted to permit the use of less sand for any given workability requirements.

"The water/cement ratio does not change significantly with a manufactured sand mixture. We're able to use less of that sand and increase the coarse aggregate factor so the amount of water going into the concrete does not change significantly."

When fines are removed from manufactured sand used in concrete mixes, workability can be increased by adding portland cement or fly ash, based on tests. "I think we'll agree that it is a lot cheaper to let the minerals in the sand do the job, not wash them out and replace them with something more expensive," McKeagney said.

"To date, few specifications have been modified to accommodate findings of the NCSA study; however, some change has taken place and hopefully will encourage further investigation of the subject."

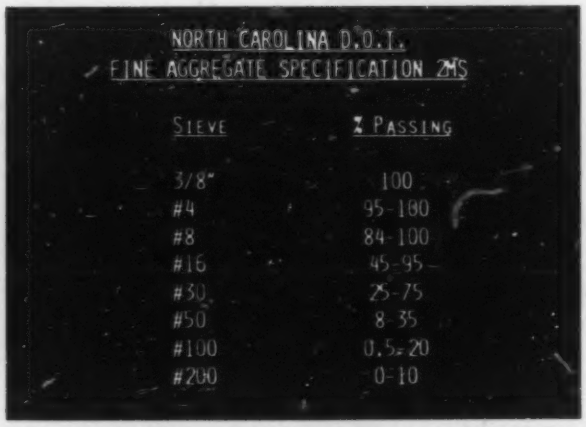
McKeagney reported that the North Carolina Department of Transportation recently conducted a study on the effects of increased fines in manufactured sand aggregates. "Following studies of several alternate gradations as they pertained to the properties of both plastic and hardened concrete, that agency chose to permit the use of fine aggregate containing as much as 10% minus 200 material. Use of the material was limited to specific projects over a 2-year period. Since January of 1984, manufactured sand aggregates were incorporated in their standard specification. Now, they permit up to 10% of fines through the 200 mesh screen and as much as 20% through the 100 screen. These specifications have been used in connection with numerous highway, industrial, and municipal projects. They are being well received by the ready-mix producers."

However, considerable research is needed in this subject, according to the speaker. "Several rock types have been investigated, but there is no assurance," he said, "that all rock types will produce a satisfactory product."

Statistics on the use of manufactured sand first were compiled in 1938 when an estimated 230,000 tons were produced. In 1982, an estimated 23 million tons were used, an increase of 100—fold in less than 50 years.

"Over that period, the nation's supply of aggregate material has undergone a gradual but noticeable change. In many metropolitan areas, natural sand supplies have been depleted or they've been made unavailable through the action of

U.S. production history for manufactured sand. (Illustration courtesy Vulcan Materials Co.)



Percentages of fines permitted in aggregate sand, North Carolina. (Illustration courtesy of Vulcan Materials Co.)

community development--local zoning boards and the like. The supply of natural materials for construction has tended to move farther out from most metropolitan areas. Transportation still is the major cost influence on such materials--once it has been produced at the plant--and in some areas it has become economical to replace natural sand with a manufactured product through crushing and classification at a site that may be closer to the area of need."

Keynote speaker David K. Phillips, director of the FHWA office of engineering, reviewed increases in federal funding that have led to accelerated highway re-construction and affected the economic health of the crushed stone industry.

Leon Noel, FHWA's pavement design chief, spoke on research and related topics, including the updating of AASHTO Interim Pavement Design Guide and the STRS program. Consultant Richard Alvin reviewed the evolution of flexible pavement design.

Robert B. McKeagney, Vulcan Materials Co., Birmingham, Ala., discussed the trend toward increased use of manufactured sand in highway and other construction aggregates.

Dr. Marshall Thompson, from the University of Illinois, analyzed the characteristics of subgrade and aggregate base materials that have significant influence on the behavior of flexible pavements under specific conditions.

Other speakers and their topics: Subsurface drainage systems were covered by Pat Ring of FHWA, Vic Mottola of New Jersey's DOT, and Dr. David Luhr of the Pennsylvania State University. Richard Root of Chicago Testing Laboratory talked on asphaltic mixtures and treatments, including all crushed stone aggregates; Richard D. Barksdale, Georgia Institute of Technology, covered thickness design for effective crushed stone use.

Frank P. Nichols, Jr. of NCSA, talking on "Meeting Pavement Needs," called for vigilance to prevent specifications from being watered down to allow a wide range of 'granular materials' subject to little, if any, process quality control.

Gary Maas, Harza Engineering Co., talked on aggregate selection and evaluation, expanding on a recent ACI Committee 221 report.

Harry Smith of the National Cooperative Highway Research Program of the TRB discussed the two major research programs now attracting the industry's attention: revision of the much-criticized AASHTO design guide for pavement structures (1972) and the proposed STRS program that could provide more than $20 million per year in pavement materials and design research. ●

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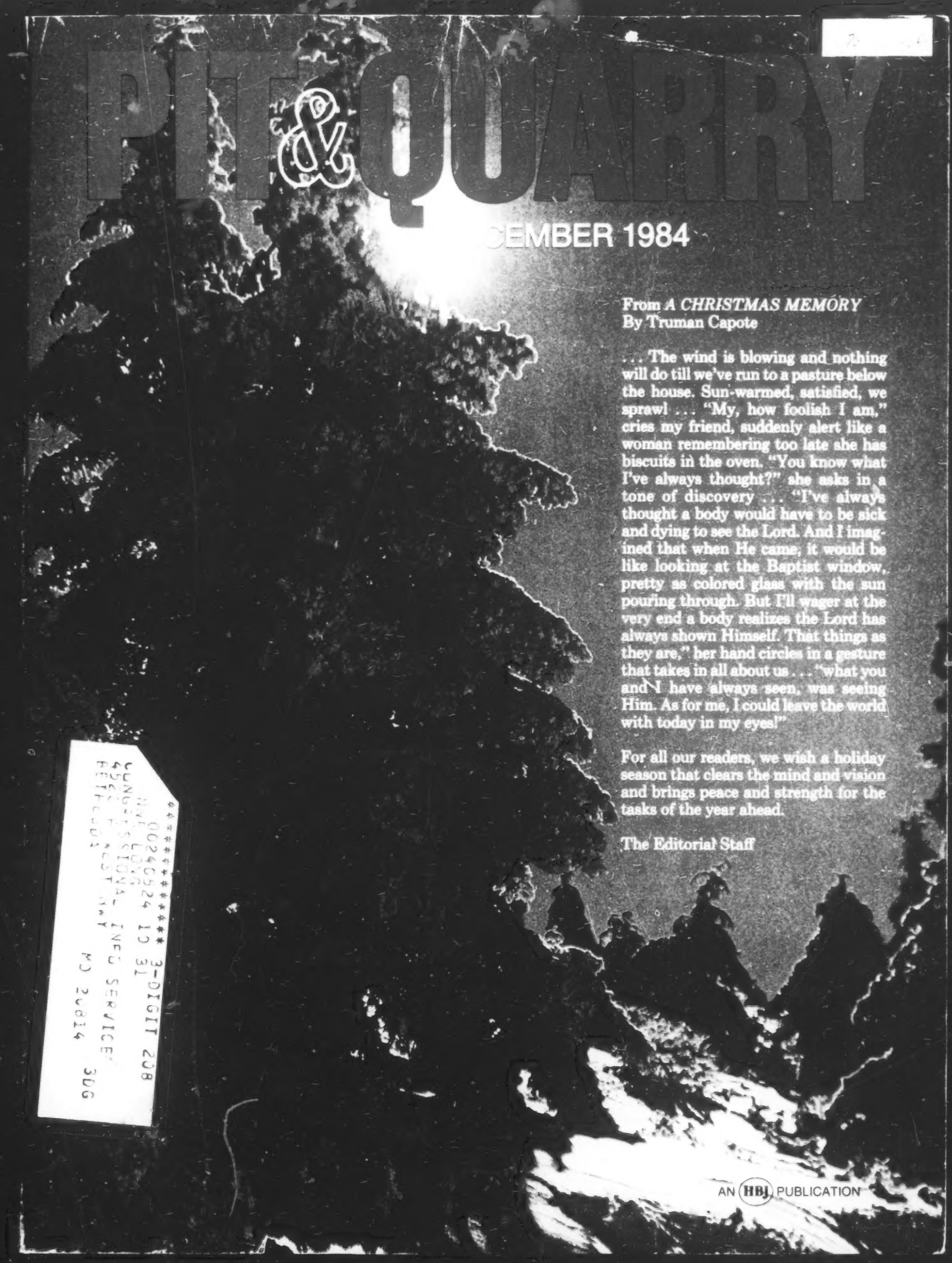

From *A CHRISTMAS MEMORY*
By Truman Capote

. . . The wind is blowing and nothing will do till we've run to a pasture below the house. Sun-warmed, satisfied, we sprawl . . . "My, how foolish I am," cries my friend, suddenly alert like a woman remembering too late she has biscuits in the oven. "You know what I've always thought?" she asks in a tone of discovery . . . "I've always thought a body would have to be sick and dying to see the Lord. And I imagined that when He came, it would be like looking at the Baptist window, pretty as colored glass with the sun pouring through. But I'll wager at the very end a body realizes the Lord has always shown Himself. That things as they are," her hand circles in a gesture that takes in all about us . . . "what you and I have always seen, was seeing Him. As for me, I could leave the world with today in my eyes!"

For all our readers, we wish a holiday season that clears the mind and vision and brings peace and strength for the tasks of the year ahead.

The Editorial Staff

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PIT & QUARRY

DECEMBER 1984 VOL. 77 NO. 6

PLANTS

26 **Granite ballast cuts railroad maintenance costs** . . . . . **Don Michard**
New Oklahoma quarry operation produces railroad ballast and by-product fines

45 **Star/Harris maintain competitive edge with joint operation**

OPERATING & TECHNICAL

◉ 36 **Those high-tech haul trucks** . . . . . **Edited by Don Michard**
Sophistication, performance, versatility characterize today's haulers

ASSOCIATIONS

43 **National Stone Association first annual convention program**

51 **National Sand and Gravel Association/National Ready Mixed Concrete Association joint annual convention programs**

SAFETY

✚ 49 **Let's eliminate falling accidents** . . . . . **David C. Meyers**

52 **Safety professionals exchange ideas at 72nd NSC Congress** . . . . . **Patricia Murphy**

GENERAL

32 **De-regulation changes railroads' views of stone shipments**
Many contract rates and options available

AND NEXT MONTH

Our annual review and outlook reports on aggregates, cement, and major nonmetallic industries will be featured

DEPARTMENTS

7 The National Scene
10 Industry News
19 Coming Events
20 Truck Topics
24 Through the Side Mirror
58 New Products, Services
64 Useful Literature
68 Manufacturers' News
70 Classified Ads
80 Advertisers' Index
81 Readers' Service Card

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MEMBER

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Comparison of 1984/1983 Construction Contract Values*

	9 Mos. 1984 (000,000)	9 Mos. 1983 (000,000)	Cumulative Percent Change
Nonresidential building	$ 54,256.2	$ 46,333.4	+17
Residential building	79,572.8	71,137.2	+12
Nonbuilding construction	27,711.0	31,074.7	−11
Total construction	$161,542.0	$148,545.3	+ 9

Dodge Index
(1977 = 100, Seasonally Adjusted)

July 1984 ..... 152 August 1984 ..... 151 September 1984 144

*Based on statistics compiled by F.W. Dodge Div., McGraw-Hill Information Systems

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to a Stamler feeder-breaker in which the chunks are fractured by a custom-designed rotary pick-breaker. The feeder-breaker then meters the reduced clinker to a belt conveyor for transfer to milling operations.

The cost-effectiveness of this phase of Santee's operation is reported as being improved by the new clinker handling system.

Advanced systems at new Genstar plant

Genstar Stone Products Co. has opened a new manufacturing and distribution center for its Sakrete and Genstar product lines. The new plant provides the benefits of state-of-the-art production equipment and processes, according to Don Ross, vice president, packaged materials.

The plant's high volume capability is due to two systems, continuous blending and valve packing. Ingredients such as cement, sand, and stone are metered automatically from hoppers in a 75-ft. tower, into a surge hopper where they are thoroughly mixed before being bagged under pressure.

"The system is designed to provide a constant uniform mix and will detect any deviation from the proper mix specification," says Ross. "The first bag in the morning will be the same as the last one in the afternoon."

A benefit of the forced bagging system is the elimination of sewn closures for squared-up folded closures. As a result, the bags are more uniform in appearance and easier to handle and stack.

Fuller offering $20,000 for new cement use ideas

Fuller International, Inc., is sponsoring a $20,000 Quest contest to search for new uses of cement. Between now and May 15, 1985, Fuller will accept entries the world over. Two prizes, $10,000 each, will be awarded, one for the most original idea and another for the idea that is closest to implementation.

Judges for the competition have yet to be named, according to the company. Official entry forms are available by writing Fuller, 2040 Avenue C, P.O. Box 2040, Bethlehem, Pa. 18001.

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Cov. 1, p. 3, 30-32, 40, 42,

44, 46-49, 57-63, 66-67.

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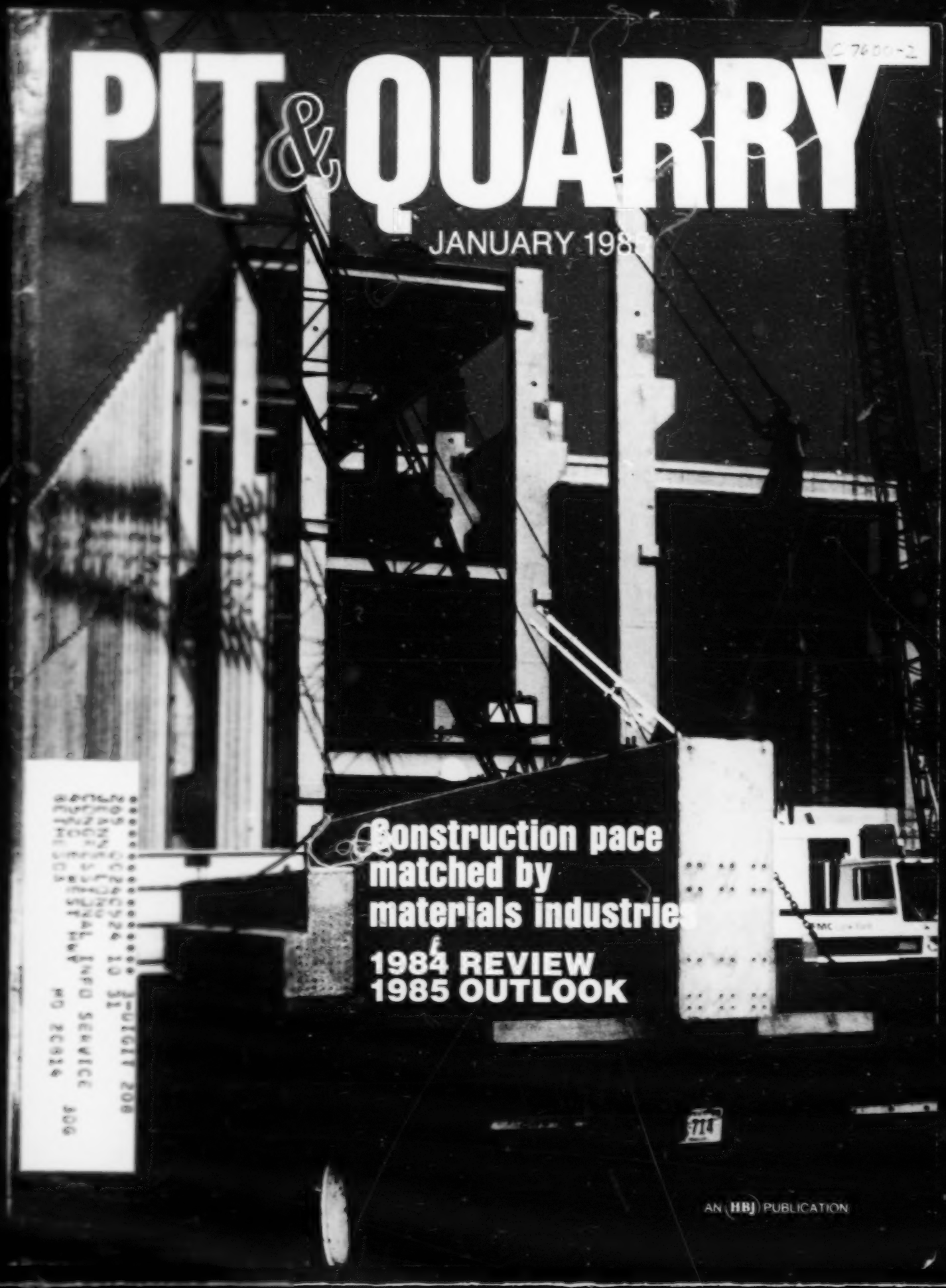
JANUARY 198



Construction pace matched by materials industries

1984 REVIEW
1985 OUTLOOK

AN (HBJ) PUBLICATION

PIT & QUARRY

January 1985 Vol. 77 No. 7

EDITORIAL

27 **A broken promise** . . . . . **Sandy Herod**

1984 REVIEW & 1985 OUTLOOK

30 **Construction** . . . . . **Jim Kostka**
1984 construction gains to slow in first half of '85

33 **Views from national association leaders**

40 **Portland cement** . . . . . **Sandy Herod**
Status and project survey

46 **Aggregates** . . . . . **Sandy Herod**
Annual survey shows industries' gains

48 **Other major nonmetals** . . . . . **Sandy Herod**

THE INTERNATIONAL CEMENT SCENE

57 **Plant and production update** . . . **Don Michard**
World cement output surges

OPERATING & TECHNICAL

68 **Crushed stone producers discover automation options** . . . **Eric Schroder**
Conference, exhibit demonstrate what's ahead for industry

ASSOCIATIONS

53 **Lime producers target environmental markets** . . . . . **Don Michard**
Prime topics at NLA meeting: plant technology, alternate fuels, market trends

AND NEXT MONTH

Material handling systems and their protection will be featured

DEPARTMENTS

6 Industry News
16 Coming Events
18 Truck Topics
22 Through the Side Mirror
74 New Products, Services
78 Useful Literature
83 Classified Ads
92 Advertisers' Index
93 Readers' Service Card

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ABC MEMBER

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The modest projected gain in public works contruction through 1984 is expected to resume by the end of the second quarter of this year.

1984 construction gains to slow in first half of '85

By J. G. Kostka

Riding the upward surge it has experienced the past 2 years, construction continued to climb during the first half of 1984. An 11% prime interest rate during the first quarter contributed greatly to the continued gain. Then in April the prime rate rose to 11.5%; by July it had reached 13%, where it remained until September.

This 2% rise was enough to put the brakes on the momentum construction had developed. Although money still was available for loans, the cost to borrow was higher. This caused some prospective construction projects to be shelved until it would be less expensive to borrow money.

In September, the prime rate began to drop and reached the 11.75% level by November. A number of bank economists feel that it will have continued to decline and by the end of the year have reached the 11% mark it was at early in 1984. This feeling is based on the fact that inflation has been held down to an annual rate of about 4% and the Gross National Product figures have shown only a very modest increase. All of which indicates no further need to raise interest rates to

curb inflation.

According to George A. Christie, McGraw-Hill Information Systems vice president and chief economist, reporting in the *1985 Dodge/Sweet's Construction Outlook*, 1984 construction amounted to approximately $211.15 billion. Because of the relatively low rate of inflation, virtually all of this figure represents actual physical construction put in place.

Construction in 1985, according to Christie, will decline slightly to $210.975 billion. Evidently the 13% prime rate in mid-1984 was a strong enough deterrent to affect the outcome of construction in 1985, when the first half of the year is expected to start out slowly, then begin to pick up momentum during the last half. If, however, the prime rate should drop below the anticipated 11% level, the recovery process could be speeded up considerably.

Against the background of total construction figures, here is what the *Dodge/Sweet's Construction Outlook* forecasts for the major construction sectors in 1985.

Housing

Individuals are most directly and economically affected by rising interest rates. As a consequence, they react to them rather quickly. This is borne out by the fact that the value of construction for one-family houses totaled $66.75 billion in 1984, and is expected to drop to $65.925 billion in 1985--the year following the jump in the prime rate.

Construction of one-family houses in 1984 totaled 1.1 million physical units, while in 1985 an estimated 950,000 will be constructed. This is a decline of 13.6% over the previous year. Prospects for 1986 look brighter, and construction of this type should reach 1.05 million units.

Construction of multi-family houses in 1984 was valued at $28.25 billion. The figure for 1985 should be around $25.825 billion. This amounts to a decline of 8.6%. There were 760,000 multi-family housing units constructed in 1984. In 1985, the total is expected to be 650,000 units, a decline of approximately 14.5%.

During the past 6 years there has been an outstanding increase in multi-family houses, rising from 30% to 43% of the total housing starts. One of the main reasons for the switch to multi-family houses was that condos were more affordable than prohibitively priced single family houses.

Since 1983, the Economic Recovery Tax Act (ERTA) has been responsible for channeling additional capital into the construction of apartments, permitting this type of building to enjoy the advantages of tax-sheltered investment by means of ERTA's liberalized depreciation allowance. It is questionable, however, how long this advantage will continue because it exists only at the pleasure of Congress and the IRS, and could be discontinued at any time.

Non-housekeeping residential construction totaled $7.15 billion in 1984 and should amount to $6.75 billion in 1985, indicating a decline of 5.6%. This represents the smallest drop in the housing construction sector.

All sections of the U.S., except the Northeast, are expected to experience a decline in the value of residential construction in 1985. The North Central will be down about 3%, the South will drop around 6%, and the West will show about a 2% decline. The Northeast is expected to remain at about the same level in 1985 as in 1984.

Non-residential buildings

Being largely dependent upon home building, non-residential building is expected to be somewhat curtailed in 1985. Commercial and manufacturing construction, which amounted to $47.55 billion in 1984, will ease downward 1.3% to $46.925 billion in 1985. Institutional and other non-residential building construction will enjoy a better fate by climbing from $24.675 billion in 1984 to $26.375 billion in 1985, a gain of 6.9%.

Stores, other commercial buildings

Construction of stores and offices closely follow housing construction. This is supportive construction necessary to help maintain the day to day life in a community. Because of its close correlation to housing construction there appears to be little hope for the expansion of retail building until the housing market springs back.

On a footage basis, retail building amounted to 405 million sq. ft. in 1984. It is anticipated that this segment of construction will wind up with a total of 410 million sq. ft. in 1985.

Due to the anticipated 1985 turnaround in housing starts, con-

Past neglect of highways and bridges is expected to spark early escalation of repair and replacement construction.

New construction in place
(Annual value in billions of 1977 dollars)

	Actual					Forecast	
	1979	1980	1981	1982	1983	1984	1985
Total new construction	179.0	161.1	157.6	150.6	167.2	182.0	185.0
Private	141.4	123.6	122.4	116.9	134.1	148.1	148.2
New housing units	60.3	44.1	40.5	32.8	52.6	61.0	55.0
Nonresidential building	36.1	35.4	39.4	41.9	38.8	43.2	46.0
Industrial	11.4	9.4	11.0	11.1	8.4	9.0	10.5
Office	7.2	9.0	11.3	14.8	13.8	12.5	12.0
Other commercial	11.8	11.2	10.9	9.1	9.3	10.6	11.6
Hospital/institutional	2.7	2.7	3.2	3.8	4.2	4.4	4.4
Public	37.6	37.5	35.1	33.7	33.1	33.9	36.8
Public building	11.9	12.5	11.5	10.9	10.9	10.4	10.9
Highways/streets	8.6	8.5	8.6	9.1	9.7	11.0	12.0
Military facilities	1.2	1.3	1.3	1.4	1.6	1.9	2.0
Conservation/development	3.8	3.8	3.7	3.3	3.2	2.9	3.4
Other public**	12.0	11.5	10.1	8.9	7.7	7.7	8.5

* Includes warehouses, grain elevators, silos, department stores, parking structures and miscellaneous other commercial buildings.
** Includes sewer systems, water supply facilities and other open construction.

Source: Bureau of the Census and PCA reports

tracting for stores and other commercial buildings should advance during the early part of 1986.

Office buildings

For a number of years office building construction supported the entire construction market. It reached its peak in 1981 when the third quarter contracting of that year reached a rate of 351 million sq. ft. In 1982 and 1983, the contracting rate for office space construction eased off to a more realistic rate of 250 million sq. ft., but it now appears the 1984 rate will be close to the all-time high of 1981.

There have been a number of reasons for the high rate of office building construction, such as: growth in the number of office workers employed, allotment of more space per worker, relocation of companies, and replacement of buildings no longer suitable for use due to obsolescence or destruction by fire.

One of the main reasons for the need for more floor space per worker is the need to make room for high tech office equipment that has been entering the business field in recent years. Another reason is the shift in office location. For a number of years there has been a strong exodus of businesses from the northern states to the Sunbelt states. The boom that began in the Southwest appears to be slowing down, since the Northeast and Midwest recently have experienced increased demands for office construction.

Although it is realistic to assume that an excessive amount of office space now exists, construction of this type continues at a high level because of a real estate tax shelter, the ERTA, that provides the benefit of accelerated depreciation. Many investors have found this type of investment relatively safe so they have continued to provide their financial support.

Institutional building

It has been 14 years since there has been any signs of increases in institutional building construction. This segment of the construction industry reached its peak in 1970 when contracting was 400 million sq. ft. per year by the end of the decade. A further decline developed in the early 1980s due to federal budget cuts, extremely high interest rates, and the erosion of tax revenues caused by the recession. This caused institutional building construction to fall to only 256 million sq. ft. by 1982.

Now, it looks as though the long decline of institutional building finally may be turning around. The long downward trend appears to have stopped, and the prospects for a resurgence in institutional construction in the coming years looks good.

School enrollments are on the rise, but, for the time being, students are occupying empty desks. It shouldn't be too long, however, before there will be a need for additional seating capacity so more schools will have to be built to satisfy the growing need.

Now that educational building construction no longer is a minus factor, the modest growth potential for several other categories of institutional building is becoming dominant. With an expected 5% increase to 280 million sq. ft. in 1985, this year may see the start of a rising trend of contracting that will bring the annual total of institutional building to 300 million sq. ft. before the end of this decade.

Public works

Aided by the Surface Transportation Assistance Act passed in 1983, taxing motor fuel 5 cents-per-gallon and alloting 80% to highway and bridge construction, construction in this category was pushed up to $17.3 billion in 1984. Continued gains are foreseen for 1985 when the total for the year climbs to an estimated $18.5 billion for a gain of 7%.

Our highways and bridges have been neglected for a prolonged period of time, so it appears likely construction in this segment will continue to escalate to bring these facilities back to a satisfactory condition. In addition, there also will be a need for the construction of new roads and bridges to meet the travel needs of a constantly shifting population.

All other public works construction totaled $15.975 billion in 1984. A small gain of 4.4% is looked for in this segment in 1985, bringing the annual total up to $16.675 billion.

Utilities

When housing construction rises, utility construction follows the same pattern. The advance in housing construction during the past 2 years has created a greater demand for utilities and, as a consequence, utility construction should rise from $3.5 billion in 1984 to an expected $4 billion in 1985 for a healthy gain of 14%.

Since construction operates on a 5- or 6-year cycle, the current cycle is only about half finished. It is felt that the pause in 1985, when there will be no marked gain or loss, will be only a temporary situation and an upward trend will be resumed in 1986 and continue for another 2 or 3 years. ●

LIME: 1984 shows 8% increase

Kenneth A. Gutschick
Executive Director
National Lime Association

Following a disastrous 1982 when total lime output in the U.S. (commercial plus captive lime) fell 25% (to 14.1 million tons), lime in 1983 rebounded slightly, rising 6% to 14.9 million tons. During the first half of this year, it appeared that lime was going to have a good year, with total output being 16% ahead of the first 6 months, but sales started to decline sharply during summer months, and it now appears that total lime in 1984 will be 8% ahead of '83 (to 16.1 million tons). In spite of this modest increase, the lime situation still is not very good, judging from the fact that the '84 output still will be an estimated 25% below the record year of 1974.

Referring to 1983, the year of the latest complete Bureau of Mines' statistics, fluxing lime, the leading lime use, gained 8% over '82 and accounted for 35% of the total lime market. Other major uses were environmental, 23% of the total market; paper and pulp, 7%; road stabilization, 5%; and building lime (mortar and plaster), 2.5%. The environmental uses mentioned above included water treatment, 10%; sulfur removal from stack gases, 7%; sewage treatment, 4%; and acid mine drainage, 2%.

In 1984, statistics through the first 9 months indicate that building lime gained 12% over the same period of 1983; stabilization lime, up 17%; chemical and industrial uses, including fluxing lime, up 14%; and refractory dolomite, up 14%. Captive lime, however, dropped 3% during the same period. This decline in captive lime, plus the poor performance of commercial lime during the last quarter of '84 compared to '83, should lead to the year ending up with only an 8% increase over the previous year.

It is expected that the poor showing for the industry during the last half of 1984 will continue into the new year, but that conditions should improve during the last half of 1985, resulting in the lime output being equal to or slightly better than in '84. On the positive side for lime, the scrubbing market is expanding slightly, having passed the 1 million short ton mark in '83. Considerable interest now is being shown in the use of hydrated lime for direct injection into power plant boilers (so-called LIMB process). Another growing market appears to be sewage sludge treatment and for stabilizing liners at waste disposal sites. Another growing use for hydrated lime involves asphalt hot mixes, where lime serves as an effective anti-stripping agent. Stabilization lime also should have a good year, especially if Congress passes the Interstate Cost Estimate early in the year, which will release federal funds for interstate construction.

Portland cement in the U.S.: status and project survey

By Sandy Herod

Production and consumption of cement in the U.S., after reversal in 1982 of a 5-year slide from the record levels of 1978, registered new growth through 1983 that continued on through the first 8 months of 1984.

Shipments of portland and masonry cement from U.S. plants, exclusive of Puerto Rico, increased in 1983 by 11% to the level of 71 million short tons, according to the latest government reports. The Portland Cement Association has projected a 9.5% increase in consumption of portland cement for the full year of 1984, and a 14.5% gain in masonry cement; or a total of about 79.3 million short tons for last year.

It is anticipated there will be some slowing of total consumption during 1985, primarily from a drop in masonry cement demand, with the final figures showing an overall gain of about 4.9% to the level of 83.2 million short tons.

The PCA cites residential construction as the primary stimulant to recovery in 1983 and on into 1984, with the 70% surge in housing starts during 1983 outweighing the effects on cement demand of slowed non-residential and public construction.

While housing starts sparked construction recovery starting late in 1982, non-residential building is expected to record some improvement during the past 12 months. It is anticipated industrial building

will have registered a 7% increase during 1984, and may climb another 17% this year.

Markets

The latest edition of a PCA economic report on the U.S. Cement Industry presents 5-year averages of apparent use of portland cement by markets; the report shows residential building (31.3%), commercial building (21.2%), and public works construction of streets and highways (18.8%) accounting for some 71% of total apparent use.

Bureau of Mines data on cement shipments show the U.S. cement industry's primary customers and the respective average percent of shipments to be: ready mixed concrete--68.5%; producers of concrete masonry, pipe, and precast or precast/prestressed components--11.8%; highway and other contractors--11.7%; and building materials dealers--6%.

Production

According to the Bureau of Mines advance summary for 1983, portland cement was produced in 139 mainland U.S. plants, plus two in Puerto Rico. Included in the 67.5 million short ton total were 4.2 million tons of cement ground from imported clinker. The total production represented about 65% of grinding capacity.

Finished shipments of portland and masonry cements from mills totaled 70.9 million short tons in 1983, an 11% climb over the 1982 level, and, through the first 8 months of 1984, at 53.2 million tons, were 17% higher than in the comparable period of 1983.

Shipments of highest volume cements, by type, in 1983, were: general use and moderate heat (Types I and II)--90%; high-early-strength (Type II)-- 3%; and oil well cements--3%.

Imports/exports

The latest government data also show a 45% jump in imports for consumption, reaching the level of 4.2 million short tons in 1983. For the same period, exports recorded a drop of 41% to a reported 118,000 tons.

Value

The value of portland and masonry cements, including imported cement shipped by domestic producers, has been reported at $3.5

**U.S. Cement Statistics*
(1000 short tons)**

	1979	1980	1981	1982	1983
Production (1)	84,491	75,224	71,710	63,355	70,420
Shipments from mills (1,2)	85,747	76,242	71,748	64,066	70,934
Exports	149	186	300	201	118
Imports for consumption	9,393	5,244	3,963	2,911	4,221

(1) Portland and masonry cements only
(2) Includes imports shipped by U.S. producers

*Abstracted from U.S., Bureau of Mines Mineral Industry Survey data

Historical Data*

	1979	1980	1981	1982	1983
Clinker capacity (annual - 1000 tons)					
Gray	88,774	85,900	89,131	86,286	88,012
White	380	437	400	321	289
Total	89,154	86,337	89,531	86,607	88,301
Wet process	45,756	42,564	37,005	33,577	33,242
Dry process	43,398	43,773	52,526	53,030	55,059
Finish grinding capacity (1000 tons)					
Gray	97,363	97,000	97,724	100,201	103,886
White	527	529	474	371	376
Grinding only	2,828	1,465	2,170	2,458	2,368
Total	100,718	98,994	100,368	103,030	106,632
Number of kilns					
Wet	191	175	145	126	121
Dry	151	152	160	148	153
Average capacity per kiln (1000 tons)	261	264	294	316	322
Kiln fuel used					
% of coal only	77%	87%	93%	96%	96%
% on oil	2%	1%	0%	0%	0%
% on natural gas	10%	10%	5%	2%	1%
Number of plants					
Gray	148	142	137	132	132
White	5	5	4	3	3
Grinding only	8	4	6	8	8
Total	161	151	147	143	143

*Abstracted from Portland Cement Association's plant information summaries

The 15 Largest U.S. Cement Companies

	Clinker Capacity* (1000 tons)	Percent of Industry Total
Lone Star Industries, Inc.	10,539	11.9
General Portland Inc.	6,142	7.0
Ideal Basic Industries, Inc.	5,449	6.2
Gifford-Hill & Co., Inc.	4,681	5.3
Lehigh Portland Cement Co.	4,543	5.1
Kaiser Cement Corp.	4,443	5.0
Southwestern Portland Cement Co.	4,135	4.7
Dundee Cement Co.	3,220	3.6
California Portland Cement Co.	3,192	3.6
National Gypsum Co.	3,180	3.6
Medusa Cement Co.	2,819	3.2
Ash Grove Cement Co.	2,814	3.2
Moore McCormack Cement, Inc.	2,739	3.1
Texas Industries, Inc.	2,300	2.6
Centex Corp.	2,182	2.5

*Includes gray and white plants

Source: PCA Market and Economic Research Plant Information Summary

billion for 1983. The average value per ton was $49.95. Average mill value, in bulk, was reported at $49.89 for portland cement and $63.74 for masonry cements.

Plant transfers, closings

In 1984, Martin Marietta completed its cement plant divestiture program; all nine of its former facilities have been sold to existing U.S. cement companies or new U.S. cement firms such as Blue Circle, Davenport Cement, Capitol Cement, and Cianbro.

During the preceding year, Ideal Basic Industries sold its Castle Hayne, N.C., facility to Moore McCormack. The latter retired its Kingsport and Richard City, Tenn., operations, along with the Castle Hayne plant, in 1983.

At the beginning of 1984, the 45 U.S. cement companies with operating kilns represented a total clinker capacity of some 88 million short tons. The clinker capacity represented by foreign ownership was about 24% of that total.

Recent U.S. projects

Aside from the U.S. cement industry's impressive growth history in this century, its more recent history displays the most startling changes in its production configuration. An historical review prepared by the PCA shows that in just the past 10 years the number of kilns in use has dropped from 445 to 274, and 74% of the retired 171 kilns were wet process equipment.

Within the 4-year period ending December 31, 1983, 21 new kilns with an average clinker capacity of 824,500 tons were installed, while 89 older kilns with an average capacity of 204,000 tons were retired. Although the reconfiguration to date shows a net loss of some 900,000 tons in total clinker capacity, and a fewer number of plants, the larger, more efficient preheater and precalciner kilns provide an individual system capacity far higher than ever known in the past. These dry process systems today represent about two-thirds of total industry capacity, of which nearly 40% involves preheaters and 20% precalciners.

The strong pace of technological reconfiguration concentrated in the years since 1971 has slowed, owing in part to the market in recent years and to having reached a high average individual plant capacity level in the industry. Accordingly, most plant projects currently in progress relate primarily to system upgrading and modifications and component replacement other than kilns.

U.S. Cement Consumption - With and Without Imports

	Portland	Masonry	Total	Cement, Clinker Imports	Domestic Cement Shipments
1979	83,267	3,686	86,953	9,413	77,540
1980	74,255	3,003	77,258	5,263	71,995
1981	70,020	2,697	72,717	3,997	68,720
1982	63,118	2,378	65,496	2,929	62,567
1983	69,411	2,883	72,294	4,268	68,026
1984(e)	76,000	3,300	79,300	5,300	74,000
1985(e)	80,000	3,200	83,200	5,900	77,300

Source: Market and Economic Research Department, PCA

U.S. Average Bulk Cement Value at Mill (per short ton) (1)

	Portland Cement	Prepared Masonry Cement (2)	All Classes of Cement
1979	$46.24	$54.59	$46.61
1980	50.89	62.11	51.32
1981	52.20	59.29	52.46
1982	51.04	61.56	51.43
1983	49.89	63.74	50.45

(1) Includes Puerto Rico
(2) Made at cement plants only

Source: Bureau of Mines 1983 Advance Summary

- Gifford-Hill Cement Co., Harleyville, S.C.--Work carried out early in 1984 provided increased capacity on existing preheater and dust collector. Supplied by the Fuller Company were a new Stage I vessel and ducting, plus dust collector compartments.
- Ideal Basic Industries, Inc., Ada, Okla.--Clinker cooler modifications completed in mid-1984 involved installation of two 834H Fuller reciprocating grate coolers and two Fuller Plenum Pulse dust collectors with heat exchangers.
- Ideal Basic Industries, Inc., Theodore, Ala.--Project underway will involve change in raw material source to realize increased capacity and lower unit cost. Corollary plant modifications will include a second raw mill system, an additional secondary crushing operation, and modifications to existing rotary dryer and conveyor systems.
- Lehigh Portland Cement Co., Mason City, Iowa--System modifications completed late last year include installation of Fuller Airslide conveying components and an N-2000 O-Sepa air separator.
- Lone Star Industries, Hagerstown, Md.--Installation is underway on an F. L. Smidth microcomputer-based kiln control system incorporating fuzzy logic techniques with which control strategies similar to those employed by kiln operators may be automated. Included with the kiln control system is an F. L. Smidth Cemscanner providing computerized control and monitoring of kiln refractories.
- Southwestern Portland Cement Co., Odessa, Tex.--A major expansion effort, scheduled for completion in May, 1985, involves installation of a 3,000-hp finish mill system, an O-Sepa air separator, a two-compartment 12 ft., 6 in. x 39-ft. ball mill, two Plenum Pulse dust collectors for the finish mill circuit, Airslide conveying equipment, and modification of the clinker cooler. All equipment is being supplied by

Fuller under a $4.5 million contract.

● Southwestern Portland Cement Co., Victorville, Calif.--Completion and commissioning of an 800,000-tpy expansion project at this location was expected by the end of the past year. The turnkey project awarded to Humboldt-Wedag U.S.A. involved a preheater/precalciner kiln (the former 500,000-tpy wet process system will be retired). Holderbank Consulting Ltd. has acted as consultant. ●

Annual aggregates survey shows industries' gains

By Sandy Herod

Majority expect no drop in 1985

Discussion of the performance of the sand and gravel, crushed stone, and lightweight aggregate industries presented in this section is based primarily on analyses of information supplied by respondents to our 29th annual year-end survey of *Pit & Quarry's* aggregate producer readership. It is complemented by commentary provided by staff leaders of national aggregate associations in another section of this review.

Production levels indicated in the following report will be somewhat less than found in those commentaries, and in the latest government figures for sand and gravel or crushed stone, since our aggregate survey is directed entirely to aggregate producers--it does not include tonnages of those materials used in manufacture of cement and lime, agriculture, glassmaking, foundries, or as raw material for any other industrial applications. Discussions of cement, lime, and agricultural markets elsewhere in the review reflect the trends in stone consumption in those areas.

In addition to production volumes, the most obvious indicators of economic trends for the aggregate industries, our survey also requests complementary information on labor, maintenance, and energy costs--factors that impact significantly on a producer's ability to survive economic fluctuations.

That information, in turn, is complemented by responses to questions concerning plans for new plants, expansion programs, and equipment replacement.

Since the producers received questionnaires early in the fourth quarter of last year, only estimates for the full 12 months of 1984 could be furnished on such factors as production volume. Data provided by each individual respondent never are identifiable, but become part of total figures assembled by geographical regions. Tabulation by regions then is combined in recapping to provide a national pattern. For some factors, weighted national averages are given (see accompanying table with summary of trends in the aggregate industries).

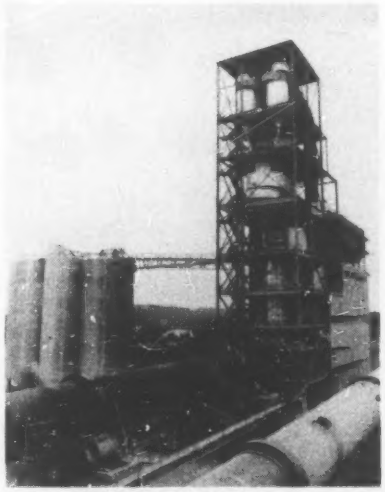
A year ago, our survey responses indicated that the aggregate industries had experienced a reversal of the downward production trend of prior years. The final government reports for 1983 bear that out and show a combined total for standard weight aggregates--sand and gravel, crushed stone, and slag--on the order of 1.3 billion tons as compared with the 1.17 billion of 1982.

Combined output of all types of lightweight aggregates amounted to some 6 million tons for a gain of 4% over the government figure for 1982.

Our 1984 survey reflects continued recovery from the lows of the early 80s, and indicate substantial estimated full year gains as reported in the following discussions of each category of aggregates. Further, the majority of our 1984 respondents anticipate that conditions in the coming year will be at least as favorable, or better, than during the past year. In all categories, those predicting a decline were in the minority.

Sand and gravel

The results of our 1983 survey, published last January, pointed to a sand and gravel production level of some 660 million tons (based on producers' fourth quarter estimates of full-year output). The Bureau of Mines preliminary figures for 1983 show an output of 666 million tons, an increase of 11% over the prior year.



California Portland's modern, 1-million-tpy preheater/flash calciner kiln at Majave, Calif., was erected adjecent to an older 5-kiln instillation representing an existing capacity of 1.1 million tons.

Our 1984 survey, just completed, indicates a further gain that, taking final quarter estimating into consideration, would be on the order of 5% to the level of about 690 million tons.

As shown in the accompanying table, about 85% of the respondents from this industry anticipate that 1985 business will be as good or better than last year.

Among the major cost factors, increases in wages (4%), maintenance (10%), and fuel/energy (8%) were within a percentage point of the

costs reported for the preceding year. With respect to prices, an almost identical percentage of respondents reported raising prices, and at the same rate--7%--as indicated in 1983.

Pumps, pipelines, dredge components, and chutework were cited as prime trouble areas in maintenance by a substantial number of respondents; however, the pure cost of carrying out that function topped all others.

Outlook: The number of respondents expecting further improvement during 1985 is about half that expressing optimism for 1984 a year ago. However, just over half of the replies to our latest survey indicate expectation of business continuing at the same level as through 1984. At 10% of the total responding, the pessimists are clearly in the minority.

In view of projected trends in construction volume (physical), the production of sand and gravel through the coming year may well surpass the level of 690 million tons.

Crushed stone

Last January, the data assembled from survey responses (incorporating fourth quarter estimates) indicated a 1983 production level of some 588 million tons of crushed stone aggregate, a reversal of the downward trend that started in the late 70s. Preliminary Bureau of Mines figures show a 610 million ton volume of construction aggregates for that year.

Our latest survey points to further gain during 1984, at rates more than double that of the preceding year; and in applying producer estimates to the 1983 preliminary government figure as a base, the volume of crushed stone aggregates may have reached the level of 680 million tons.

In the area of costs, about one third of our 1984 respondents experienced no change in maintenance expense; and for those who did report an increase, it was at an average slightly higher than in the prior year. Among those reporting an increase in fuel/energy costs, it was at a rate one third higher than in 1983. With respect to labor cost, the increase reported was about half that indicated for 1983, but productivity recorded a minimal gain as well.

Crusher wear parts and welding were the paramount maintenance factors noted by most of the quarrymen, but were only just slightly more troublesome than the care and feeding of mobile equipment such as loaders and haulers.

Outlook: As our aggregate industry summary table shows, more than 80% of our respondents are divided about equally between expectations for further improvement in 1985 and for a continuation of current production levels.

In view of the fact that the aggregate industry performed better than producers predicted a year ago, and with a view toward anticipated construction activity in 1985 at levels equal to or higher than last year, the production of crushed stone aggregates during 1985 could reach the level of about 715 million tons.

Lightweight aggregates

In the report on our 1983 survey of the lightweight aggregate materials, it was indicated that there had been a small increase in output that year, on the order of 1%, with a total of about 6.8 million tons. Later government data show that figure to be about 800,000 tons high. Of the revised volume of 6 million tons, about 4.4 million constitute expanded clays and shales, with the balance made up of expanded slags, pumice, perlite, and vermiculite in descending order of volume.

The 1984 full year estimates recently received from survey respondents reflect a strong surge in the expanded clay/shale sector; overall, the lightweight aggregate industry apparently produced some 6.3 million tons of material during the past year.

Our 1984 returns show that, nationally, about 70% of the lightweights are marketed to the concrete masonry industry, with most of the remainder to ready-mix and lightweight precast and precast/prestressed concrete structural component manufacture.

While a little more than one third of the respondents reported raising prices last year, the majority held the line. However, as might be expected with energy intensive processing systems, fuel/energy costs reported by those who had experienced an increase were appreciably higher than those reported by producers of standard weight aggregates.

Wage increases reported by 82% of the respondents averaged out to 6% higher than the preceding year. Fortunately, productivity per man-hour rose at an identical rate.

Outlook: With a larger percentage of respondents looking for further improvement in 1985 than was the case a year ago, and with only

Summary of Pit & Quarry's 1984 Aggregates Industry Survey*

	Sand & Gravel	Crushed Stone	Lightweight Aggregates
Review of 1984			
Production reported (+ or − vs. 1983)	+ 5%	+10%	+10%
Prices			
raised (% of replies)	39	45	36
average % raised (weighted)	7	6	21
Wages			
raised (% of replies)	83	95	82
average % raised (weighted)	4	2	6
Maintenance costs			
up (% of replies)	55	49	27
% of increase (weighted)	10	11	20
Fuel/energy costs			
up (% of replies)	50	36	33
% of increase (weighted)	8	12	32
Productivity (T/Mnhr)	+ 9	+ 1	+ 6
Outlook for 1985			
Expecting gain (% of replies)	33	44	68
% gain expected (weighted)	15	15	21
Expecting decrease (% of replies)	11	16	5
% decrease expected	12	12	5
No change (% of replies)	52	40	27
Plans reported (% of replies)			
New plants	17	15	18
Expansions	28	34	18
Equipment replacement only	34	33	50

**Does not include processed slags*

5% of the returns anticipating a decline, it appears that the lightweights as a group are headed for a production level of some 6.8 million tons during the coming year.

This is supported by the anticipated 5% increase in physical construction volume projected by construction market analysts. ●

Other Major Nonmetals

By Sandy Herod

Agstone/aglime

According to preliminary information collected and provided by the National Limestone Institute, the nation's farms were treated with about 25.54 million tons of agricultural limestone during 1983, an increase of some 2.3 million tons over the 1982 level. These figures are based on reports supplied to NLI by the departments of agriculture in 24 states, plus ASCS or extension services in 19 others. No usage reports were received from seven states, and the data do not include Puerto Rico or the Virgin Islands.

The estimated total tonnage of agstone used in 1983, although 10% higher than in the preceding year, still falls far below the estimated 68 million tons needed for annual application as determined by the respective states.

Calcined limestone marketed as agricultural lime in 1983, according to the latest Bureau of Mines reports, amounted to 61,000 tons, or an increase of nearly 30% over the 1982 figure.

Lime

Through the first 8 months of 1984, according to the latest government data available, total sales of lime in the form of quicklime and hydrate amounted to slightly more than 9 million tons; a gain of 17% over the same period in 1983.

Final figures for the latter year indicate sales or use by producers of some 14.9 million tons, valued at $758 million, which in turn represented increases of 6% and 9%, respectively. With the regained momentum displayed by the industry's performance through the past year, final 1984 figures could well top 15 million tons in sales and use. The industry's record year was 1974, in which some 21.6 million tons were produced.

Through August 1984, in comparison with the same period of 1983, chemical sales had increased 17%, construction sales were up 16%, refractory sales gained 21%, and agricultural sales jumped 52%.

Phosphate Rock

During the 1984 crop year (July 1, 1983-June 30, 1984), production of marketable phosphate rock amounted to 46.8 million metric tons, valued at $1.1 billion, for an increase of 27% over the 1983 crop year. In the latter period, marketable production had dropped 19% from the 1982 crop year, but the data for the year ending June 30, 1984 indicate a gain over 1982 of 3%.

Florida and North Carolina producers account for about 85% of the total marketable phosphate rock; production in Idaho, Montana, and Utah represents nearly 12% and Tennessee operations produce the remaining 3%.

Potash

While preliminary government figures for potash production in the 1983 crop year (latest available) show an increase of 10% in apparent consumption, marketable production of 1.43 million metric tons K20 equivalent reflects a 20% drop from the 1.78 million metric tons of the 1982 crop year. The U.S. continues to be a net importer of potash, with Canada providing a volume equal to about 69% of domestic apparent consumption during the 1983 crop year.

Gypsum

During the first 8 months of 1984, according to the latest Bureau of

Mines reports, some 9.6 million short tons of crude were mined by U.S. gypsum producers, an 18% increase over the same period of 1983. Imports totaled about 5.9 million short tons, which was about 21% higher than in January-August of the previous year.

Domestic production of calcined material was reported at 9.9 million tons, an increase of 13% over the comparable period in 1982, and markets for that material (board products, building and industrial plasters) used some 12 million short tons, a gain of 15% over the comparable first 8 months of 1983.

In another important construction material market, consumption of uncalcined gypsum by the portland cement industry amounted to a little more than 2 million short tons through August 1984, which was an 18% rise over the 1982 consumption for the same period of the previous year.

Barite

The latest government data on barite, covering 1983, show sales or use by producers of 754,000 tons valued at $29.2 million--a drop of 59% and 58%, respectively, from the 1.8 million short tons (valued at $69.5 million) of 1982.

The principal use for barite, as a weighting agent in oil- and gas-well drilling fluids, accounted for 96% of 1983 consumption. Accordingly, fluctuations in oil supply, and changes in the oil and gas industry's drilling parameters, have had the effect of depressing demand for this commodity.

Talc and Pyrophyllite

Production of crude talc and pyrophyllite in 1983 as reported by the Bureau of Mines totaled 1.06 million short tons valued at $20.3 million. These figures represent a decline, respectively, of 6% and 2% from 1982.

However, crude and processed material sold by producers in 1983 amounted to 1.16 million short tons, an increase of 13% over the previous year, and was valued at approximately $109 million. Operations in Montana, New York, Texas, and Vermont accounted for 90% of talc production, of which 35% is used in ceramics.

Feldspar

In 1983, according to the latest government data, production of feldspar and nepheline syenite--including soda, potash, and fledspar--silica mixtures--climbed to the level of 710 short tons valued at $22.5 million. This represents gains of 15% in volume and 11% in value over the preceding 1982 levels.

The gain, which brought the commodity back to 1980 levels, was sparked by resurgence in housing construction with its improved market for ceramics and fiber insulation.

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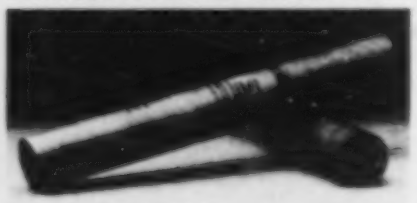

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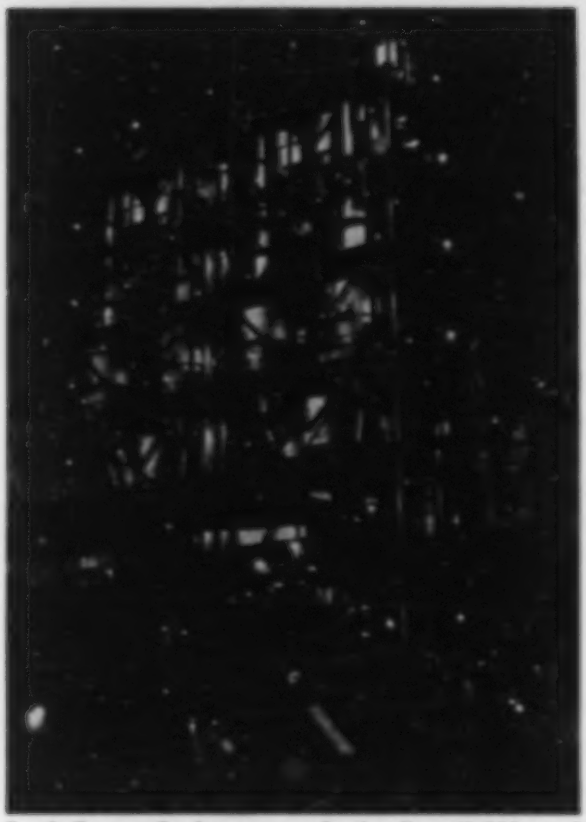
World cement output surges

Edited by Don Michard

International cement scene: plant/production update



South Cement Co. has two production lines (3,200 mtpd clinker output, each) in new plant at Rashadiya, Jordan. Principal equipment supplied by Kobelco; Consultant was Kaiser Engineers and Constructors.

The 5% increase in world cement production through 1983 represents a substantial breakout from the pattern of recent years; still, it's a gain that must be tempered with realism.

The accompanying table (world cement production) shows the most recent figures supplied by the Bureau of Mines, U.S. Department of the Interior, and published in their 1983 Minerals Yearbook.

Any rebound from a condition of decline tends to look impressive. A comparison of 1983's estimated production with the figures of 1981 show the difference between '83 and '81 (the last reported growth year) to be 4.2%. U.S. production in 1983, for example, still lags behind the level of 1981, despite a dramatic increase of almost 11% over 1982. A similar trend is exhibited for many of the industrialized nations (see table, "20 Leading Cement Producing Countries"), while a number of developing economies show more consistent growth in cement production over the 1981-83 period.

Cement plant completions and construction status reports--compiled from a number of international industry sources and summarized on the following pages--showed a decline for the 1985 *Pit & Quarry* cement industry outlook and review. It's another trend that requires careful interpretation. During the last 2 years, when the construction industry recession bottomed out, a number of projects were completed, while new construction plans were shelved or postponed. Most likely, the period 1984/85 will reflect a time of planning and evaluation with an increase in construction activity to show up in the next few years.

Production figures, (where available) listed above each country's plant progress reports are expressed in millions (mmt) or thousands (kmt) of metric tons. Data are from the 1983 Bureau of Mines Minerals Handbook.

AFRICA

Algeria

Production (83/82): 295.2/295.2 kmt

Cement plants are state-owned, under jurisdiction of Societe Nationale des Materiaux de Construction.

• Sour El Ghozlane: New 3,000-mtpd plant, equipped with two Tirax-Unidan raw material mills, two Unidan cement mills and kiln with preheater, went on stream in 1983. Princ. equip. supplier: F.L. Smidth & Co.

• Ain Touta: New 1 million-mtpy turnkey plant under construction by F.L. Smidth. Scheduled completion: 1985/86.

Congo, People's Republic of

Production: Not reported

• Loutete Cement Factory, Loutete: Production capacity was increased from 100,000 to 120,000 mtpy through addition of a larger reciprocating plate feeder, a new impact crusher, and increased capacity of raw material grinding unit. Prime contractor: KHD Humboldt Wedag AG.

Egypt

Production (83/82): 5.8/4.2 mmt

• Helwan Portland Cement Co., Cairo: Two new cement clinker pro-

duction lines under construction. Capacity: 3,700 mtpd each. Systems include the following major equipment supplied by KHD Humboldt Wedag AG: two Pyroclon preheater units; two rotary kilns (4.8 x 67m); and two tubular coolers (6 x 52m).

• National Company for the Production of Cement, El Tabbin: Revised startup date for added 4,500-mtpd production line is early 1985. Major suppliers: KHD Humboldt Wedag and CGEE Alston S.A. Clinker will be produced in a 76 x 5m rotary kiln with a twin-type preheater and an additional in-line firing arrangement. Dyckerhoff Eng. GmbH is consultant.

• Suez Cement Co., Beer Odeib: Fuller Co. supplied equipment for new plant with capacity of 3,300 mtpd. Major components: Raw material mill; SF-141 preheater with flash calciner; 15 x 16 x 240-ft. rotary kiln; two each finish mills and grate clinker coolers; silos; three Fuller-Kinyon systems; Airslide fluidizing gravity conveying systems. Start up, late 1983.

• Tourah Portland Cement, Tourah: Constructing two new dry process production lines (8 and 9) of 1 million mtpy each with commissioning scheduled for 1985 and 1986. Major equipment being supplied by general contractor Fives-Cail Babcock (Paris) includes a polar preblending installation and eight shoe-mounted ball mills for raw feed and cement grinding.

Ivory Coast

Production: Not reported

• Societe des Ciments d'Abidjan (SCA) completed two major projects during 1983: At the Abidjan grinding facility, installation of a grinding mill to increase capacity to 800,000 mtpy; in the port of San Pedro, SOCIM set up a 420,000-mtpy grinding operation. Fives-Cail Babcock was primary equipment supplier for the projects.

Morocco

Production (82/83): 3.7/3.8 mmt

• Cimenterie Nouvelle de Casablanca, Bouskoura: New 1.2-mtpy dry process plant was put on-line in June 1983. Consulting engineer: Lafarge Conseils et Etudes. Turnkey contractor: Fives-Cail Babcock.

• Ciments d'Agadir, Agadir: Fives-Cail Babcock furnished a type E vertical ball mill converting the cement plant to coal firing operation.

• Societe Ciments Artificiel di Meknes, Cadem: Fives-Cail Babcock supplied primary equipment for conversion from 1,000 to 1,500 mtpd capacity, and wet to dry process.

Mozambique

Production (82/83): 290/297 kmt

• Cimentola de Mozambique has commissioned Asland S. A., Spain, to study engineering and set up for rehabilitation of two plants, at Maputo and Nacala. Production goal for upgraded plants is a nominal cement production capacity of 700,000 mtpy.

Sierra Leone

Production: Not reported.

• Seracem Company activated a grinding facility equipped with a mill furnished by Fives-Cail Babcock. Plant capacity: 100,000 mtpy. General contractor: Societe des Ciments d'Origny.

South Africa

Production (82/83): 7.7/7.3 mmt

• Blue Circle Cement, Lichtenburg: Cement production expansion from 1,300 to 2,600 mtpd by Krupp Polysius. Major equip.: Two precalcining systems; double rotator raw material mill (235 mtph capacity).

• Natal Portland Cement Co., Simuma: New plant, 1,450 mtpd capacity, with major equip. furnished by F.L. Smidth: Tirax Unidan raw material mill; dry process kiln; and Tirax coal mill. On stream 1983.

• Pretoria Portland Cement Co., Dwaalboom: New plant, capacity of 2,000 mtpd, with major equip. installed by F.L. Smidth: Tirax-Unidan raw material mill; kiln with precalciner; Unidan cement mill; andTirax coal mill. Projected on stream 1985/86.

Togo

Production: Not reported

Ciments du Togo, Lome: Expanded capacity of clinker grinding plant from 250,000 to 400,000 mtpy; major equip. included a grinding mill furnished by Fives-Cail Babcock. General contractor: Koch Transporttechnik; engineer: Prospective Engineering Gestion.

Plant owned by Oman Cement Co., installed by Polysius Corp., was commissioned at Muscat, Oman in 1984

ASIA

Burma

Production (82/83): 221/224 kmt

• Ceramic Industries Corp., Pa-An: Near completion of 840-mtpd suspension preheater/rotary kiln plant. Commissioning scheduled for 1985. General contractor: Fives-Cail Babcock.

• Ceramic Industries Corp., Thayetmyo: Potential rehabilita-

tion of three production lines under investigation. Consultant: Dyckerhoff Eng. GmbH.

China

Production (82-83): 136.4/92.5 mmt

• Guangxi Building Materials Export Supply Corp., Liuzhou: Expansion of 3,200 mtpd capacity projected on stream by 1985/86. Principal equip. furnished by F.L. Smidth: 4.5 x 68 precalciner kiln with Folax grate cooler and two cement mills.

India

Production (82-83): 24.6/32.1 mmt

• Andra Cement Co., Durga: Plant to be expanded from 1,350 to 3,000 mtpd. Major equip., supplied by F.L. Smidth & Co., includes: Atox raw material grinding mill; precalciner system; and Atox coal mill. Completion: 1986.

• Avarpur Cement, Chanda: New dry process, 3,200 mtpd plant with precalciner kiln, a Tirax raw material grinding mill, and two Unidan cement mills. Scheduled completion: late 1986. Princ. equip.: F.L. Smidth & Co.

• Birla Jute Manufacturing Co., Ltd., Chittogarh: Extension of plant to include 1,900 mtpd kiln with precalciner, a Tirax-Uniden raw material mill, a Combidan cement mill, and a Tirax coal mill. Scheduled completion: 1986. Princ. equip.: F.L. Smidth & Co.

• Cement Corp. of India, Neemuch: Expansion of existing plant by 1 million mtpd (adding new 3,000 mtpd dry process kiln line). Clinker grinding furnished from sites. Princ. equip. by Fuller includes: SF-141 preheater with flash calciner; rotary kiln (15 x 220 ft.); Fuller Loesche raw material grinding mill and coal mill. Start up third quarter 1985. Consultant: Development Consultants International.

• Gujarat Ambuja Cement Ltd., Mahuva: Krupp Polysius to furnish 1,800-mtpd plant equipped with Prepol AS precalcining kiln, 220 mtph capacity roller mill for raw material grinding, 24-mtph coal grinding mill, and two cement mills with capacity of 120 mtph each.

• Gujarat Industrial Investment Corp., Morasa: New 3,300-mtpd plant will include kiln with precalciner, an Atox raw material grinding mill, two Combidan cement mills, and a Tirax coal mill. Scheduled completion: 1986. Princ. equip. suppliers: F.L. Smidth/ Larsen & Toubro.

• Gwalior Rayon Silk Mfg. Co., Vicram: Cement plant under production by diversified textile producer will have clinker capacity of 1,800 mtpd. Dry process system includes a Pyroclon preheater and other major components furnished by KHD Humboldt Wedag.

• Hira Cement Works, Sambalpur (Orissa): Slag grinding mill being installed (late 1984 commissioning projected) and technical/ economic study under way for 1,500-mtpd dry process line in existing plant, directed by Development Consultants International.

• Indian Rayon Corp., Ltd., (200 km SE of Heydarabad): New dry process cement plant with clinker capacity of 1,500 mtpd. System includes a Pyroclon preheater, 3.8 x 50m kiln, tandem raw meal grinding system, and Humboldt Wedag coal grinding plant. KHD Humboldt Wedag AG is primary equipment supplier.

• Kessoram Industries & Cotton Mills, Ltd., Sedam (state of Karnataup): New 1,500-mtpd plant to have following major components supplied by Krupp Polysius: Raw material roller mills; Multiflow raw meal blending units (18 m dia.); Prepol AS precalcining kilns with grate coolers; coal grinding mills; and cement mills. Scheduled start up: 1984/85.

• Madras Cements, Ltd., Jayanthipuram: New cement plant, 1,900 mtpd capacity, to include kiln with precalciner, Combidan cement mill, and Atox cal coal mill. Scheduled completion: 1986. Princ. equip. supplier: F.L. Smidth.

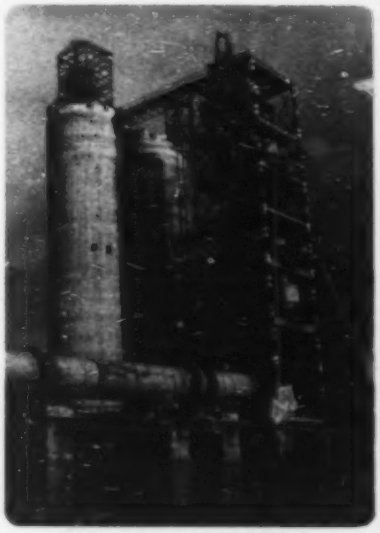
• Manikgarh Cement (Div. of Century Spinning & Mfg.), Chandrapur: New grass roots 1 million mtpy dry process plant, constructed by Fuller International, with following major equipment: Fuller-Loesche raw material mill; rotary kiln (15 x 220-ft.) SF 141 preheater with flash calciner; Fuller-Loesche coal mill; 1/8 Airmerge 'piggyback' blending sytem; and two open circuit Fuller finish mills. Contract includes instrumentation and control engineering, start up, and commissioning, scheduled for March 1985.

• Modi Rubber Ltd., Bhatapan (Madhya Pradesh). Plant equip.

WORLD CEMENT PRODUCTION

	(Million metric tons)	(% change)
1980	868,673	+1.2
1981	873,532	+0.6
1982[2]	864,649	−1.0
1983[3]	910,149	+5.2

1 Source: 1983 Bureau of Mines Minerals Yearbook
2 Estimated
3 Preliminary



New 750-mtpd dry process plant owned by Hetauda Cement Industries Ltd., Nepal, went on-line in March 1984. Equipment, including a four-stage preheater, was furnished by Walchnadnagar Industries; consultant was Development Consultants International.

(capacity 3,300 mtpd) furnished by Krupp Polysius, includes kiln system with Prepol AS and reciprocating grate cooler, roller mill for raw grinding capacity of 30 mtph, circular coal stacker/reclaimer system (20,000 mt capacity), and two cement mills with capacity of 113 mtph each.

• Mysore Cements Ltd., Damoh (Mahdy Pradesh): Dry process plant with 1,500 mtpd capacity is equipped with a. 3.8 x 50m kiln including a five-stage Pyroclon preheater; tandem raw meal grinding system; cement grinding is performed at a remote facility. KHD Humboldt Wedag AG is principal equipment supplier.

• Raymond Cement Works, Patharia, Madhua Pradesh: Extension incorporating 1,500/3,850-mtpd F.L. Smidth kiln with five-stage calciner string; and 4.2 x 12m cement

mill; automated QCX control. On stream (projected) 1985/86.

• Rewa Cement Co.: Krupp Polysius is installing a precalcining system Prepol AS for a 3,000-mtpd plant that includes a roller mill for 280 mtph of raw material, a 35-mtph coal mill, and two cement mills with capacity of 100 mtph each.

• Saurashtra Cement and Chemical Industries, Ltd., Ranavav, Gujarat: Modernization. Princ. equip. by Fuller: 14 x 200-ft. rotary kiln; SF-135 preheater with flash calciner rated at 2,500 mtpd; Fuller-Loesche raw grinding mill; and reciprocating grate cooler. New total capacity, 2,600 mtpd; start up, second quarter 1984.

• Shree Digvijay Cement Co., Ltd., Digvijaygram: Conversion of existing wet kiln to a 2,500-mtpd precalcining kiln. Princ. equip. by F.L. Smidth: Cyclone preheater with precalciner; Folax grate cooler; and coal grinding equipment. On stream 1984.

• Shree Cement, Beawar: New 1,800-mtpd plant. Princ. equip. by F.L. Smidth/Larsen & Toubro: 3.95 x 56m precalciner kiln with Folax cooler; Atox raw grinding mill; and Atox coal grinding system. On stream 1984.

• Straw Products Ltd., Lakshmi Cement, Sirohi, Rajasthan: Existing 1,500-mtpd plant expanded to 3,500 mtpd through installation of a precalciner, directed by Development Consultants.

• Texmaco, Ltd., Yerraguntla: New plant, 1,500 mtpd capacity with following major equipment furnished by F.L. Smidth: Tirax-Unidan raw material mill; dry process kiln; Combidan cement mill; amd Tirax coal mill. On stream 1984.

• U.P. State Cement Corp., Churk: New dry process line (1,500 mtpd) added to existing plant to include a precalcinator, under direction of Development Consultants, Ltd.

• J.K. White Cement Works, Gotan: Expansion of white cement production plant (300 mtpd). Princ. equip. furnished by F.L. Smidth: Tirax-Unidan raw material mill; dry process kiln; and Unidan cement mill. On stream 1984.

Indonesia

Production (83/82): 8.3/7.4 mmt

• P.T. Semen Andalas Indonesia, Lho Nga, Belawan (Northern Sumatra): New production and packing plants with clinker capacity of 3,000 mtpd. Princ. equip. by Kobe Steel Ltd. includes NSP suspension preheater with dual combustion and denitration furnace. Startup March 1983. Consultant Cementia Engineering and Consulting Ltd., Switzerland.

• P.T. Perkasa Agung Utama Cement Enterprise, Cibinong (Java): Cement facility has production capabilities of 4.5 mtpy Portland cement and 200,000 tpy of white cement in six production lines. Three of the lines were built by KHD Humboldt Wedag AG between 1976 and 1983.

• P.T. Semen Cibinong, Naragong (West Java): Existing plant capacity increased by 250,000 mtpy. Oil-fired kilns converted to coal burning. Commissioned 1984. Consulting engineers: Raymond Kaiser Engineers and Kaiser Cement Corp.

• P.T. Semen Tonasa (Biringere Complex) Tonasa, South Sulawesi: Scheduled full operation of major expansion by first quarter of 1985. Dry process production line, capacity of 590,000 mtpy, was added. Princ. equip.: (F.L. Smidth and Coutinho, Caro & Co.) four-stage cyclone preheater and 4.75 x 75 m, 1,900-mtpd rotary kiln; VM 4.4 x 12m cement mill. Consultant: Dyckerhoff Engineering, GmbH, West Germany.

Iran

Production (83/82): 9.6/9.3 mmt

• Ourmia Cement Co., Ourmia: New 2,000-mtpd cement plant will be equipped with a precalciner kiln, raw material grinding mill, and two cement mills. Scheduled for completion late 1986. Princ. equip. supplier: F.L. Smidth.

Iraq

Production (83/82): 5.5/5.5 mmt

• SOIDAC (State Organization of Industrial Design & Construction), Badoosh: Plant expansion, to 3,200 mtpd capacity, recently completed, including installation of a new IHI precalciner unit. Contractor: Fives-Cail Babcock.

• SOIDAC, Muthanna: Turnkey cement plant with capacity of 2 million mtpy includes all processes from limestone crushing to shipment facilities. First production line commissioned 1984. Two lines will produce 3,200 mtpd (each) with following components, furnished by KHD Humboldt Wedag: rotary kilns (4.4 x 64m); Pyroclon preheaters; and automated controls. KHD Engineering GmbH has 3-year operating/management contract for the facility.

Jordan

Production (83/82): 1.2/0.8 mmt

• Arab Company for White Cement Industry, Khaldiya: New 300-tpd white cement plant. Dry pro-

Cimenterie Nouvelle de Casablanca brought this new 1.2 million-mtpy cement plant (Casa II at Casablanca, Morocco) on line in mid-1983. Fives-Cail Babcock was principal equipment supplier.

cess; short kiln with preheater. Contractor: B.K.M.I. Industrieanlagen GmbH, West Germany. Consulting engineers: Basse Sambre-E.R.I. Startup scheduled for late 1984.

• Jordan Cement Factories Co., Ltd., ordered major add-on components for their plant at Fuhais: a 1,000-mtph limestone crusher; a 21,000-mt pre-blending bed; a 200-mtph cement mill; four packing plant lines; and related equipment. Material furnished by Kobe Steel. Contract date, April 1984; scheduled startup, January 1987. Holderbank Management and Consulting, Ltd., is consultant.

• South Cement Co., Ltd., initiated production of new two-line plant at Rashadiya. Startup: No. 1 line, June 1984; No. 2 line, August 1984. Prime subcontractor Kobe Steel furnished major equipment including a suspension preheater with dual combustion and denitration furnace. Each line has clinker capacity of 3,200 mtpd. Consultant: Kaiser Engineers and Constructors.

Macao
Production: Not reported

• Macao Cement Manufacturing Co., Ltd., Coloane: Acceptance tests completed during 1984 on new grinding plant with 500,000 mtpy capacity; Fives-Cail Babcock supplied principal equipment.

Malaysia
Production (83/82): 3.1/3.0 mmt

• Associated Pan Malaysia Cement Pte. Ltd. (APMC), Kanthan: Replacing two wet process lines with a dry process clinker facility in 500,000-mtpy plant. Improved facility is equipped with a Pyroclon preheater and firing system using coal and/or oil for optimum energy cost efficiency. KHD France S.A. is primary equipment supplier.

• Cement Industries of Malaysia, Berhad: Ordered major expansion to their plant at Bukit Ketri, Perlis, scheduled for September 1986 startup. Clinker capacity of expanded plant will be 2,000 mtpd. Turnkey project, furnished by Kobe Steel will include suspension preheater with dual combustion and denitration furnace. Engineer: Holderbank Management and Consulting, Ltd.

• Kedah Cement Sdn. Bhd., Pulau Langkawi, Kedah State: New coal/oil fired plant with 4,000 mtpd capacity completed in September 1984. Ishikawajima-Harima NSF process adapted for calcining; IHI performed turnkey contract, including engineering.

• Perak-Hanjoong Simen Snd. Bhd.: Raymond Kaiser Engineers is serving as consultant for a 1.2 mtpy plant and two distribution depots. Turnkey contractor is Korea Heavy Industries Construction Co., Ltd. Princ. equip. (by Fuller): 16 x 240-ft. rotary kiln; SF-141 preheater with flash calciner; reciprocating grate cooler; 42-in. gyratory crusher; Fuller-Loesche roller mill; Fuller-Loesche coal mill; and two 13 x 45-ft. finish mills. Tentative startup: May 1986.

Nepal
Production (83/82): 45.5/25 kmt

• Hetauda Cement Industries Ltd., Hetauda: New 750-mtpd dry process plant with four-stage preheater commissioned in March 1984. Equipment supplied by Walchadnagar Industries; Consultant, Development Consultants International.

North Yemen
Production: Not reported

• Ministry of Economy and Industry: Proposals were being evaluated late in 1984 for construction of a grassroots cement factory at Mafraq, with capacity of 500,000 mtpy. Plant to feature dry process, short kiln with preheater and precalciner. Consultant: Basse Sambre/E.R.I.

Oman
Production: Not reported

• Oman Cement Co. (S.A.O.) Ruwi: New grassroots cement facility, 2,000 mtpd, has been operating since late 1983. Dry process, using short kiln with preheater and precalciner. Prime contractor: Krupp Polysius; consultant: Basse Sambre/E.R.I.

Pakistan
Production (83/82): 3.7/3.6 mmt

• Anwarzaib Cement Industries Ltd., Hyderabad: Construction of a white cement plant, capacity 50,000 mtpy, to start. Plant will feature dry process, long kiln. Contractor: Onoda (Japan). Consultant: Basse Sambre/E.R.I.

• Fecto Cement, Ltd., Islamabad: New grass roots plant, 2,000 mtpd capacity, scheduled for two-phase start-up in July 1986 and July 1987. Major equipment includes a 13.5 x 190-ft. rotary kiln; two (each) raw and finish grinding mills; state-of-the-art dust collecting system; and four-stage preheater. Construction by Fuller Co.

• State Cement Corp. of Pakistan will investigate possible rehabilitation and modernization of six plants during 1985, with the following objectives: Convert to dry or semi-dry process; explore possibility of using coal as alternative fuel for clinker burning; increase overall productivity and energy efficiency. Involved plants: Associated Cement, Rohri, Wah; Gharibwal Cement, Pind Dadin Khan; Maple Leaf Cement, Daud-khal; Mustekham Cement, Hattar; and Zeal Pak Cement, Hyderabad. Consultant: Dyckerhoff Eng. GmbH.

Qatar
Production (83/82): 250/257 kmt

• Qatar National Cement Co., Doha: Construction of lime hydration plant currently in engineering and equipment fabrication stages. Plant capacity: 10 mt of hydrated lime/hour. Consultant is Basse Sambre/E.R.I.

Saudi Arabia
Production (83/82): 5.9/5.9 mmt

• Arabian Cement Co., Ltd., Rabigh: Turnkey cement plant has four kiln lines and clinker production rate of 4,000 mtpd; kiln dimensions are 4.4 x 160m. Facility includes all process from limestone crushing to product shipping. Princ. contractor: KHD Humboldt Wedag A. G. Plant on stream in 1984.

• Qassim Cement Co., Buraydah: Expansion project to attain clinker production capacity of 2,200 mtpd. Ishikawajima Heavy Industries NSF process will be adapted to calcining; turnkey project projected for completion in early 1987. Engineer: Holderbank Management & Consulting.

• Saudi-Bahraini Cement Co., Abqaiq: Ishikawajima Harima Heavy Industries was principal contractor for a cement plant designed by Holderbank. Plant comprises four kilns, each with clinker capa-

city of 1,500 mtpd. Theoretical annual production capacity is 1.8 million tons of cement. Plant produces Type I Portland cement and Type IV sulphate resistant cements.

• Yamama Saudi Cement Co., Riyadh: Sixth production line brings plant total capacity to 8,700 mtpd. Major equip.: two circular stacker/reclaimer systems; roller mill, Prepol AS system; reciprocating grate cooler; cement mill; computer controlled production, laboratory automation, and cement dispatching automation systems (by Krupp). Plant furnished under turnkey contract by joint venture of Krupp Polysius and Bilfinger & Berger, West Germany.

• Yanbu Cement Co., Jeddah: Third clinker production line (1,000 mtpd capacity) added to existing plant; started operation in 1984. New line comprises raw material transport system from existing mills, two blending bins, raw meal proportioning section, rotary kiln (4.4/4.8 x 160m), a Humboldt Wedag grate cooler, new clinker silo, conveying system, and a third clinker grinding facilty (90 mtph output). Prime contractor: KHD Humboldt Wedag AC

20 LEADING CEMENT PRODUCING COUNTRIES

Production, million metric tons

	1983	1982	1981
USSR	125.8	121.6	125.0
China	106.4	92.5	82.6
Japan	79.3	79.3	83.4
USA	63.6	57.4	65.0
Italy	38.5	39.0	40.8
Brazil	37.6	25.2	25.6
W Germany	30.5	30.6	32.3
Spain	30.1	28.5	28.1
India	24.6	22.1	20.4
France	24.1	25.7	27.8
S Korea	20.9	17.6	15.3
Mexico	16.6	19.0	17.8
Poland	15.9	15.8	14.0
Romania	14.7	14.7	14.5
Taiwan	14.6	13.2	14.1
Turkey	13.4	15.5	14.8
United Kingdom	13.2	12.7	12.6
E Germany	11.8	11.5	12.0
Czechoslovakia	10.3	10.1	10.5
Iran	9.8	8.3	7.9

Source: Bureau of Mines Minerals Yearbook, 1983

Singapore

Production (83/82): 2.6/2 mmt

• Asia Cement Corp., Hualien: New clinker grinding plant, the first in Singapore, was started up in 1983. Contractor: KHD Humboldt Wedag.

South Korea

Production (83/82): 20.9/17.6 mmt

• Halla Cement Mfg. Corp., (northeast of Seoul): Near completion of 12 million-mtpy coal-fired plant.

• Hanil Cement Manufacturing Co., Ltd.: Equipment furnished by Krupp Polysius includes Prepol AS precalcining system (1,600 mtpd); circular stacker/reclaimer (70,000 mt), and cement mill (75 mtph).

• Tong Yang Cement Manufacturing Co., Ltd.: Two in-place Dopol preheaters were equipped with Prepol AS systems increasing capacity from 2,300 to 4,600 mtpd each. Also--two double rotator raw material mills (170 mtph each) and one cement mill (150 mtph). Princ. equip. supplier: Krupp Polysius.

Sri Lanka

Production (83/82): 498/638 kmt

• Sri Lanka Cement Corp., Kankesanthurai: Extended clinker production line with capacity of 3,200 mtpd was completed in 1984. Rotary kiln (4.6 x 70m) is equipped with a Humboldt Wedag grate cooler.

Taiwan

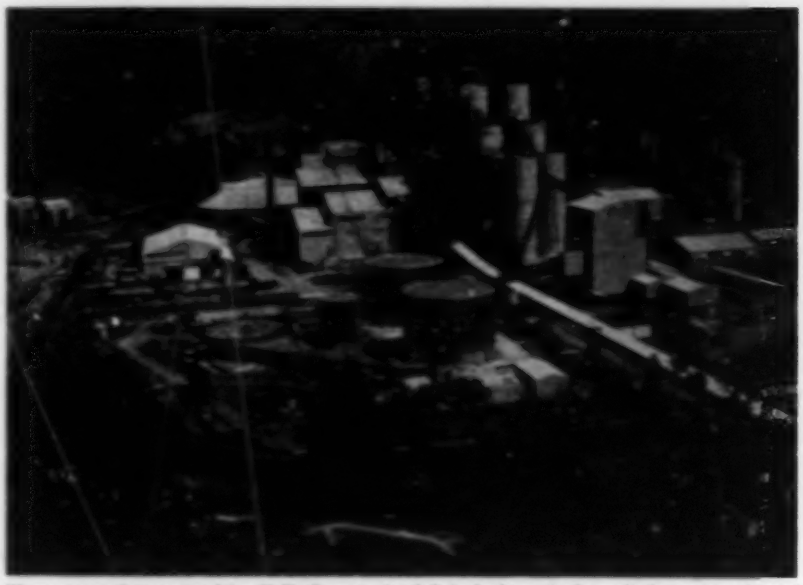
Production (83/82): 14.6/13.2 mmt

• Asia Cement Corp., Hsinchu: New clinker production line, furnished by KHD Humboldt Wedag, consists of tandem grinding plant for raw meal production; a Pyroclon preheater with tertiary air piping from the clinker cooler; kiln with dimensions of 4.6 x 64m. System is designed for a daily capacity of 3,000-mt clinker.

Thailand

Production (83/82): 7.1/6.5 mmt

• Siam Cement Co., Ta Luang: Major conversion of existing plant undertaken by Ishikawa-Harima Heavy Industries includes replacement of fuel oil firing equipment for



New operation owned by P.T. Semen Andalais Indonesia has clinker capacity of 3,000 mtpd. Start up took place in 1983. Principal equipment supplier, Kobe Steel; Cementia Engineering and Consulting Ltd. was consultant.

precalciners at two 400-mtpd cement kilns.

• Siam City Cement Co., Tabkwang: Ordered plant expansion to increase capacity by 1.8 mtpy. Major equipment: 5,500-mtpd production line with precalciner material kiln, two raw material grinding mills, two cement mills, and two coal mills. F.L. Smidth furnishing equipment, engineering, and supervision. Plant is scheduled for completion in 1987.

United Arab Emirates
Production (83/82): 3.5/2.9 mmt

• National Cement Co., Dubai: Existing 1,500-mtpd wet process plant converted to 1,800-mtpd dry process facility supplied by F.L. Smidth. Commissioned December 1984. Consultants: Development Consultants Int., Ltd.

• Umm Al Qiwain Cement Industries Company, Al Raafah: 500,000 mtpy clinker grinding plant, first phase of a 1 mtpy cement plant. Consulting engineer: W.S. Atkins, United Kingdom. Contractor: Hitachi Zosen Corp.

Yemen
Production: Not reported

• Ministry of Industry, Aden (Batis Cement plant): New 1,200-mtpd dry process plant to be equipped with four-stage preheater, under direction of Development Consultants, Ltd. Commissioning planned for late 1987.

CENTRAL AMERICA

Barbados
Production: Not reported

• Arawak Cement Co., St. Lucy: New 300,000-mtpy plant was started up in 1984. It is a joint venture between the Barbados government and the governments of Trinidad and Tobago. Voest Alpine, Austria, was turnkey supplier and Holderbank Consulting Ltd. handled project supervision on behalf of the Barbados government.

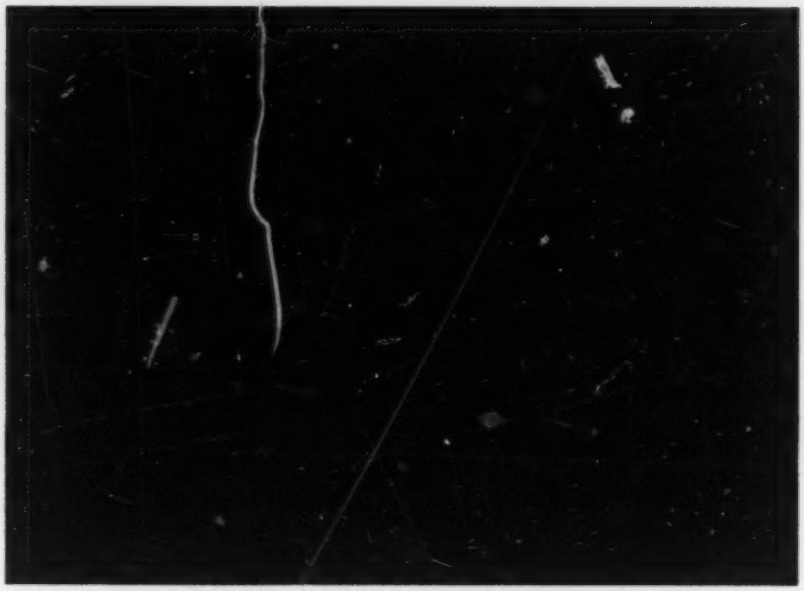
Mexico
Production (83/82): 16.6/19 mmt

• Cementos Guadalajara, S.A., Guadalajara: Plant expansion, 2,250 mtpd, went on stream in 1983. F.L. Smidth supplied major equipment including a Tirax-Unidan raw material grinding mill; kiln with precalciner; and two Combidan cement mills.

• Cementos Mexicanos, S. A., Huichapan: New plant, 3,200 mtpd capacity, furnished by F.L. Smidth. Major equip.: Tirax-Unidan raw material mill; kiln with precalciner; and three Combidan cement mills. Projected on stream 1985/86.

• Cementos Tolteca S.A., Zapotiltic: Plant extension of 2,500 mtpd; princ. equip. furnished by F.L. Smidth: two Tirax-Unidan raw material mills and kiln with precalciner. On stream in 1983.

• Empersas Tolteca de Mexico, S.A. de C.V.: Completion nears on 940,000 mtpy expansion to existing plant. Project includes modifications and additions to reduce costs, improve product quality, and meet environmental requirements.



At Fuhais, Jordan, Kobe Steel furnished major add-on components to this cement plant. Consultant: Holderbank Management and Consulting.

EUROPE

France
Production (83/82): 24.1/25.7 mmt

• Societe des Ciments Francais, Bussac: Fives-Cail Babcock was awarded contract for plant modernization and capacity increase from 1,800 to 2,800 mtpy.

Hungary
Production (83/82): 4.2/4.3 mmt

• Cement and Lime Works (state enterprise), Vac: New limestone crushing plant incorporated into a 5,000 mtpd (clinker) capacity facility, first phase of an overall plant modernization. Plant produces hourly rate of 800 mt of graded limestone using coarse and fine impact crushers. Primary contractor: KHD Humboldt Wedag. Commissioned in 1983.

Italy
Production (83/82): 38.5/39 mmt

• Cementeria Siciliane SPA: Polysius traveling grate preheater, 2,000 mtpd capacity.

• Cementizillo SPA: Krupp Polysius erecting a 60-mtph cement mill.

• S.A.C.C.I. Cement SPA: Cement grinding plant, 120 mtph capacity, furnished by Krupp Polysius.

Luxembourg
Production (83/82): 64.2/64.2 kmt

• Ciments Luxembourgeois, Esch-sur-Alzette: Krupp Polysius furnished a 50-mtph cement mill.

Portugal
Production (83/82): 5.8/5.9 mmt

• Secil Companhia Geral de Cale Cimento, Setubal: Plant extension, 3,500 mtph, with major equipment furnished by F.L. Smidth: Atox raw material and coal mills and kiln with precalciner. On stream 1984.

Spain
Production (83/82): 30.1/28.5 mmt

• Cementos Alfa S.A. of Spain, Mataporquera: Fuller International refurbished an existing 850-mtpd plant. Major improvements: SP-126 preheater (with riser duct burning system); furnished clinker cooler with baghouses; existing 3.45m diameter kiln modified; electrical, instrumentation, and motor controls. Startup 1983.

• Cementos Noroeste S.A., Vigo: Second production line of Oural cement facility being extended from 600 to 1,200 mtpd. Primary contractor is Centunion, Madrid/KHD Humboldt Weda[AG. Work includes installation of a new Pyroclon preheater with tertiary air line.

• Cementos Portland de Jalon S.A., Zaragoza: Increased production from 300 to 500 mtpd. Major equipment and modifications by Fuller International included: SP-120 preheater and modification of clinker cooler and plant's wet milling system. Start up June 1983.

Switzerland
Production (83/82): 4.1/4 mmt

• Jura Cement, Jura: Addition of precalcining unit will increase capacity by 1,800 mtpd. Also: roller mill with raw grinding capacity of 200 mtph; coal mill, capacity of 13 mtph; reciprocating grate cooler; major equipment supplied by Polysius Corp.

Turkey
Production (83/82): 13.4/15.5 mmt

• Turkiye Cimento Sanayii reports on seven dry process plants completed, or near completion in various parts of the country: Adiyaman, started operation in July 1983; Ladik, started operation in August 1984; Ergani, started up in mid-1984; Siirt, scheduled for first quarter 1985 startup; others to be announced. Plants will average 1,750 mtpd clinker production. Major equipment includes Humboldt preheater kilns and raw meal grinding plants. Princ. equip. supplier: KHD Humboldt-Wedag. Consultant: Dyckerhoff Eng. GmbH.

United Kingdom
Production (83/82): 13.2/12.7 mmt

• Blue Circle Cement, Dunbar: Krupp Polysius furnishing plant equipment that includes 3,000 mtpd capacity precalcining system, coal roller mill (18.5 mtph) and raw material roller mill (275 mtph).

• Blue Circle Leasing Ltd., Dunbar Cement Works, Dunbar, East Lothian: Taylor Woodrow Construction (Scotland) was awarded a modernization contract for existing plant to include: Preheater/precalciner system; roller mill; cooler system; and flue gas cleaning equipment. Completion: May 1985.

• Ketton Cement Ltd: Production system of 3,000 mtpd including one Prepol AS system with Polysius (major equip. supplier) reciprocating grate cooler, roller mill (245 mtph raw grinding capacity), coal grinding system (34 mtph), and two cement mills (90 mtph each).

• Blue Circle Industries, Cauldon: Expansion of plant capacity to 2,600 mtph. Major components installed by F.L. Smidth: Atox raw material mill and kiln with precalciner. On stream 1984.

West Germany
Production (83/82): 30.5/30.6 mmt

• Readymix Zementwerke GmbH & Co., KG, Beckum: Reconditioning of cement plant to increase clinker production from 3,000 to 3,500 mtpd. Major operations: Rework of kiln (80 x 5.3m) and addition of Humboldt preheater. Contractor: KHD Humboldt Wedag AG.

OCEANIA

New Zealand
Production (83/82): 747/768 kmt

• Wilson Portland Cement, Portland: Wet to dry process plant conversion was completed in April 1983 for 400,000-mtpy plant. Major equipment, furnished by Fuller International, included: Loesche raw material roller mill; Airmerge system and blending equipment; SP-126 preheater; 850-H reciprocating grate cooler; kiln refurbishing; new Program Logic Control operating system.

In mid-1984 Saurashtra Cement & Chemical Industries, India, completed modernization of 2,600-mtpd plant at Ranavav. Additions include a new Fuller preheater/kiln line.

SOUTH AMERICA

Argentina
Production (83/82): 5.6/5.5 mmt

• Calera Avellaneda S.A., Olavarria: Conversion of production line to use Pyroclon preheater in kiln increased production capacity from 400 to 700 mtpd. Major equip. installed by KHD Humboldt Wedag AG/Centunion, Madrid. Conversion completed in 1984.

• Cementos NOA, S.A. suspended construction of a 700,000-mtpy plant at Juramento (Salta), because of the "financial and political situation in Argentina." Asland S.A., Spain, is consultant.

Brazil
Production (83/82): 37.6/25.2 mmt

• Climinas-Cimento Nacional de Minas, Pedro Leopoldo: Plant expanded to capacity of 2,900 mtph, on stream in 1983. Major equipment furnished by F.L. Smidth: Tirax-Unidan raw material grinding mill; kiln with precalciner; and two Unidan cement mills.

• Cia. Cimento Portland Itau, Itau de Minas: Extension of plant to 1,000 mtpd. Major equipment furnished by F.L. Smidth: Triax-Unidan raw material grinding mill; dry process kiln; two Combidan cement mills; and Triax coal mill. On stream 1984.

• Cimento Portland Mato Grosso S.A., Cuiaba: New 600,000-mtpy plant under construction, to burn coal as primary fuel, with capability to use alternate energy sources.

• Cia. de Cimento Portland Rio Branco, Curitiba: Plant expansion, two new production lines, each rated at 2,200 mtpd. Major equipment in each section, furnished bv F.L. Smidth: Tirax-Unidan raw material mill; dry process kiln; two Unidan cement mills; and Tirax coal mill. Completion: 1984.

• Cimento Tocantins S.A., Brasilia: Extension of plant to 1,000 mtpd. Major equipment furnished by F.L. Smidth: Tirax-Unidan raw material mill; kiln with precalciner; Unidan cement mill; and two coal mills. On stream 1984.

• S.A. Industrias Votorantim, Santa Helena: F.L. Smidth is installing a 1,250-mtpd precalciner kiln in an existing plant. Completion: 1985/86.

Colombia
Production (83/82): 5.1/4.9 mmt

• Cementos Boyaca S.A., Nobsa: New clinker production line under construction by KHD Humboldt Wedag and Centunion will produce 1,000 mtpd when completed in 1986. New line will include a 4.6m diameter kiln and a 173m satellite cooler, using the wet process. Consultant: Holderbank.

• Cementos Rioclaro, Rio Claro: New plant with 1,600 mtpd capacity. Primary equipment (F.L. Smidth supplier): dry process kiln; raw material and coal mills by Tirax. Projected on stream 1985/86.

Paraguay
Production (83/82): 98/108 kmt

• Industria Nacional de Cemento, Vallemi: Conversion of plant from wet to dry process is expected to increase production to 1,400 mtpd. Major equip., supplied by Fuller: two SP-122 preheaters; clinker cooler modification; raw material mill modification; and Fuller Airmerge 1/8 blending system. Start up 1983.

• Cement plant at Vallemi is being converted from 200,000 mtpy (wet line) capacity to nominal 450,000 mtpy dry process; a new production line of 600,000 mtpy will be added. Major equipment furnished by F.L. Smidth; consultant Asland, S.A., Spain. Startup is scheduled for 1985.

• Industria Nacional del Cemento, Vallemi/Villeta: New plant and extension (capacity 2,000 mtph) with following major equip. furnished by F.L. Smidth: Tirax-Unidan raw material mill; kiln with precalciner; and Unidan cement mill. Projected on stream 1985/86.

Peru
Production (83/82): 2.3/2.5 mmt

• Cementos Andino S.A., Condorcocha: Situated some 3,900m above sea level, this existing plant is one of the highest cement producing facilities in the world and requires special design considerations. Built in the 1960s, the facility is undergoing extensive modification by KHD Humboldt Wedag. Major improvements: clinker production increase from 800 to 2,100 mtpd by adding secondary Pyroclon preheaters to existing preheater lines; raw meal production will be converted to a tandem system; the rotary kiln (4 x 53m) will be renovated. •

New coal/oil fired plant was completed in September 1984 for Kedah Cement, Pulau Langkawi, Malaysia. IHI Inc. provided major equipment including NSF process adapted for calcining in turnkey contract. Plant capacity: 4,000 mtpd.